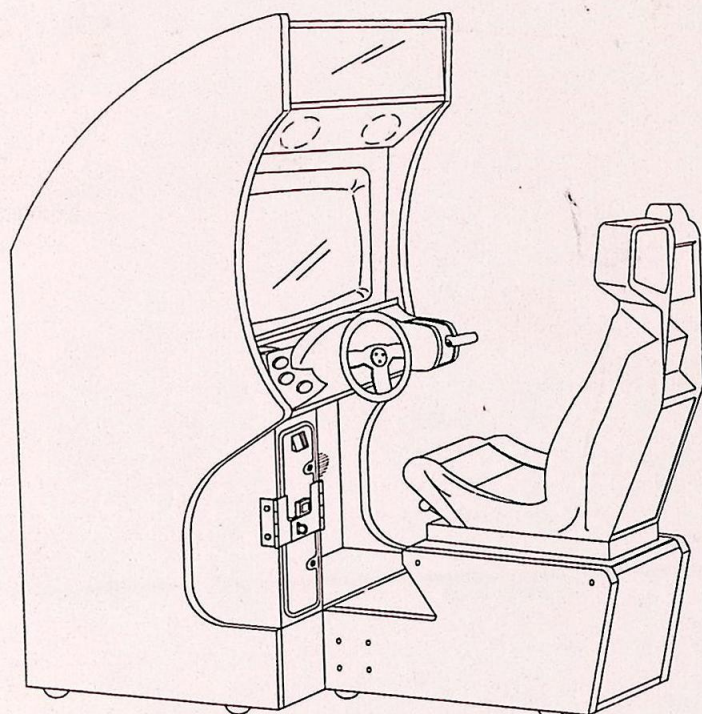
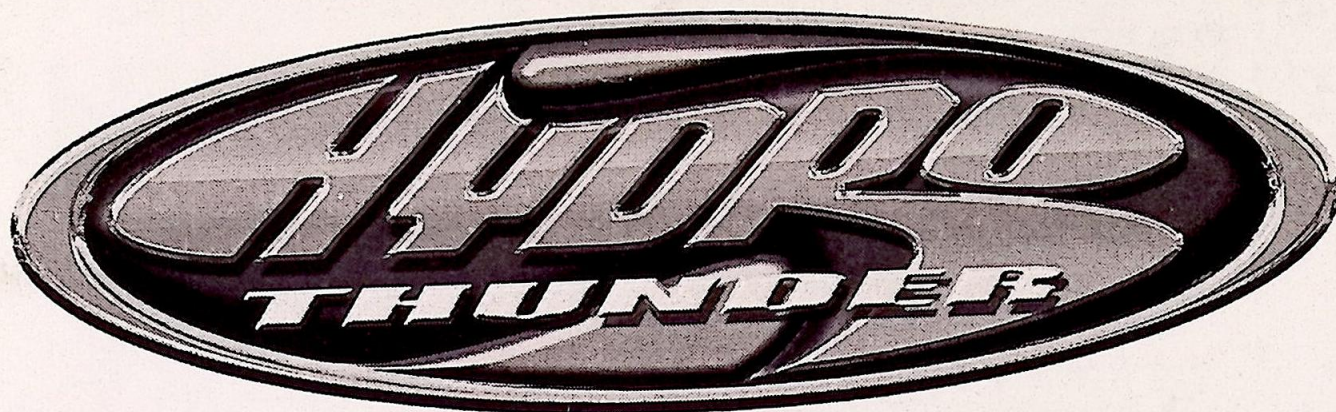




FEBRUARY 1999  
16-20033-101



# SIT-IN DEDICATED VIDEO GAME

## 25" CABINET



### Operations Manual Includes

- Installation ● Operation ● Testing & Problem Diagnosis
- Parts Information ● Wiring Diagrams ● Product Service

Midway Games Inc.  
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Chicago, Illinois 60618-5899  
United States of America

Look on our Website for more information. <http://www.hydrothunder.com>







# HYDROTHUNDER<sup>TM</sup>

## CHAPTER ONE

### PRODUCT SAFETY, SPECIFICATIONS, SET UP, & MAINTENANCE



**NOTICE:** This manual is subject to change without notice. MIDWAY reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods may warrant.

Fill out and mail in the Game Information Card. Include the game serial number from the label on the rear of the cabinet. For your records, write the game serial number in the manual.

SERIAL NUMBER \_\_\_\_\_



## **SAFETY INSTRUCTIONS**

The following safety instructions apply to operators and service personnel. Read these instructions before preparing the game for play. Other safety instructions appear throughout this manual.







### **DEFINITIONS OF SAFETY TERMS**

**DANGER** indicates an imminent hazard. If you fail to avoid this hazard, it **WILL** cause death or serious injury.





**WARNING** indicates a potential hazard. If you fail to avoid this hazard, it **COULD** cause death or serious injury.

**CAUTION** indicates a potential hazard. If you fail to avoid this hazard, it **MAY** cause minor or moderate injury. **CAUTION** also alerts you about unsafe practices.

**NOTICE** indicates information of special importance.

	<b>WARNING: TRANSPORTING GAMES.</b> This game contains glass and fragile electronic devices. Use appropriate care when transporting this game. Avoid rough handling when moving the cabinet. Do not move this game with the power on.
	<b>WARNING: DISCONNECT POWER.</b> Always turn the power OFF and unplug the game before attempting service or adjustments unless otherwise instructed. Installing or repairing PC boards with power ON can damage components and void the warranty.
	<b>WARNING: GROUND GAMES.</b> Avoid electrical shocks! Do not plug in a game until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Do not use a "cheater" plug, or cut off the ground pin on the line cord.
	<b>WARNING: AVOID ELECTRICAL SHOCKS.</b> This video game system does not utilize an isolation transformer. Internal cabinet AC is not isolated from the external AC line.
	<b>WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE.</b> If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion.
	<b>CAUTION: CHECK POWER SELECTOR, LAMP.</b> Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on the game. Verify that the fluorescent lamp assembly is correct for the local line voltage.



	<b>CAUTION: USE PROPER FUSE.</b> Avoid electrical shock! Replacement fuses must be of the same type as those they replace. Fuse voltage and current ratings must match ratings on the original fuse.
	<b>CAUTION: ATTACH CONNECTORS PROPERLY.</b> Be sure that printed circuit board (PCB) connectors mate properly. If connectors do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty. Connector keys only allow a connector to fit one set of pins on a board.
	<b>CAUTION: USE CARE WHEN SHIPPING HARD DISKS.</b> The hard disk drive must be packed in an anti-static bag. When shipping the drive for repair or replacement, pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives.
	<p><b>WARNING: HAZARD TO EPILEPTICS.</b> A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.</p> <p>If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g., seizures or loss of awareness), immediately consult your physician before using any video games.</p> <p>We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, <b>DISCONTINUE USE IMMEDIATELY</b> and consult your physician.</p>



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## PRODUCT SPECIFICATIONS

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### Operating Requirements

<u>Location</u>	<u>Electrical Power</u>	<u>Temperature</u>	<u>Humidity</u>
Domestic	120VAC @ 60Hz 4.0 Amps	32°F to 100°F	Not to exceed 95% relative
Foreign	230VAC @ 50Hz 2.0 Amps	(0°C to 38°C)	
Japan	100VAC @ 50Hz 4.0 Amps		

### Cabinet Statistics

<u>Shipping Dimensions</u>	<u>Shipping Dimensions</u>	<u>Shipping Weight</u>
<b>Cabinet</b> Width 32.0" (81.3 cm) Depth 66.5" (169 cm) Height 76.0" (193 cm)	<b>Universal Pedestal</b> Width 22.0" (55.8 cm) Depth 36.0" (91.4 cm) Height 51.0" (130 cm)	<b>Cabinet</b> Boxed 328 lbs. (149 kg.) <b>Pedestal</b> Boxed 125 lbs. (56.8 kg.)

### Equipment Characteristics

<u>Video Display Monitor</u>	<u>Audio System</u>	<u>Currency Acceptors</u>
Medium Resolution RGB 25" (63.5 cm) CRT	Digital Stereo Sound Two 5.5" (14 cm) and One 6.5" (16.5 cm) Spkr	2 Coin Mechanism, Coin Counter Dollar Bill Validator Ready Electronic Coin Acceptor Ready

### Game Characteristics

<u>Player Variables</u>	<u>Operator Variables</u>	<u>Diagnostics</u>
1 to 4 players per game (with linking) Choice of craft and course High Score Recognition	Coinage, Game Options Difficulty, Force, Volume, Audits, Statistics	Automatic Power-Up Self-Test Manual Multi-Level Menu System

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## PRODUCT CONFIGURATION

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### ◆ Stand Alone Units

Each game is ready to play right out of the box. Operators may use the menu screens in the game menu system to determine some player variables in advance or leave the choices up to the players.

### ◆ Linked Units

Linking allows players to compete against each other (on one course). Operator menus are the same as in stand alone games. Crossover couplers and linking cables to connect two games are factory installed. Use the optional Hub Linking Kit to interconnect up to eight games (two groups of four).

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## MAINTENANCE

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### ◆ Viewing Glass

It is not necessary to switch off power to the game to clean the glass. Apply a mild glass cleaner to a clean cloth or sponge, then use this to wipe the viewing glass. **Do not apply the cleaner directly on the glass!** Liquid could drip down into switch or control circuits and cause erratic game operation.

### ◆ Player Controls

Use plastic-safe non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge, then use this to wipe the player controls. **Do not apply the cleaner directly on the controls!**

### ◆ Cabinet and Seat

Use plastic-safe non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge, then use this to wipe the seat or cabinet. **Do not apply cleaner directly on artwork or cabinet!**



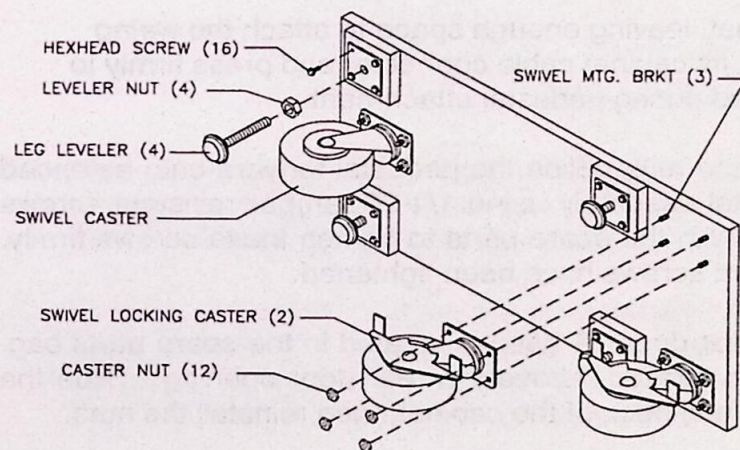
## GAME SETUP



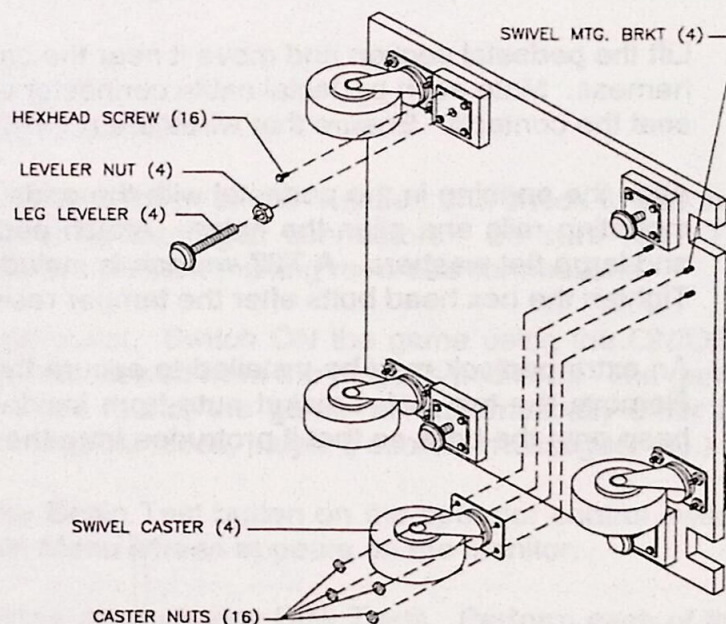
**WARNING:** The cabinet is top heavy. Do not use the pedestal seat as a handle or lever. Use the two handles on the back of the cabinet when moving the game.

1. Remove all items from shipping containers and set aside. Casters, levelers, and mounting hardware are packed with the pedestal section. Inspect the exterior of the cabinet for any signs of damage.
2. Remove the keys from the steering wheel. Unlock and open the coin, cash box, and rear doors. Electrical cords and game spare parts are in the cash box. Locate the casters and levelers first.
3. Install one nut onto each leg leveler. Tilt as needed to locate four threaded holes under the cabinet and three under the pedestal. Install a leveler and nut into each hole. Do not tighten nuts at this time.

BOTTOM VIEW OF PEDESTAL ASSEMBLY

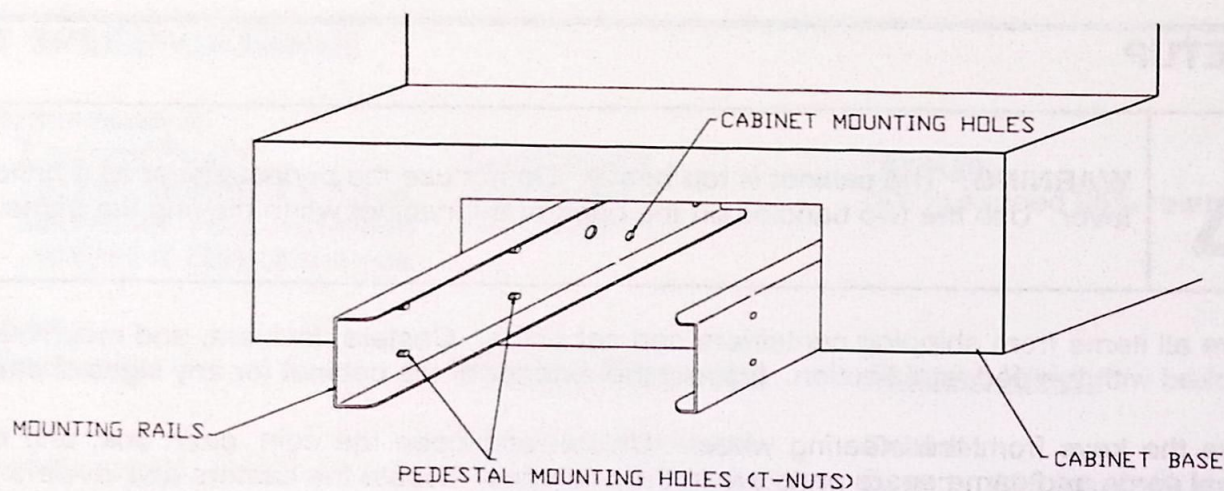


BOTTOM VIEW OF CABINET ASSEMBLY



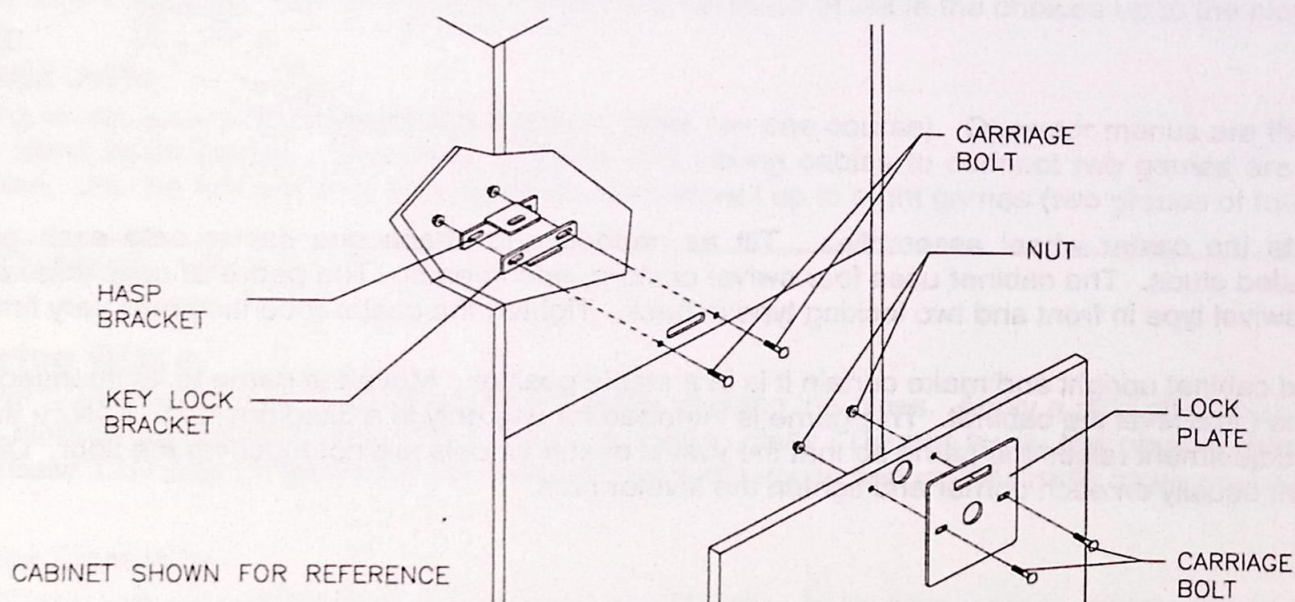
4. Locate the caster wheel assemblies. Tilt as needed and attach one caster onto each group of threaded studs. The cabinet uses four swivel casters, one in each. The pedestal uses three casters, one swivel type in front and two locking type in back. Tighten the caster mounting nuts very firmly.
5. Stand cabinet upright and make certain it is in a stable position. Move the game to its intended location and level the cabinet. This game is intended for use only in a fixed position. Ensure that the final adjustment raises the game so that the swivel caster wheels are not touching the floor. Distribute weight equally on each corner and tighten the leveler nuts.





### LOCATION OF PEDESTAL ASSEMBLY MOUNTING HOLES

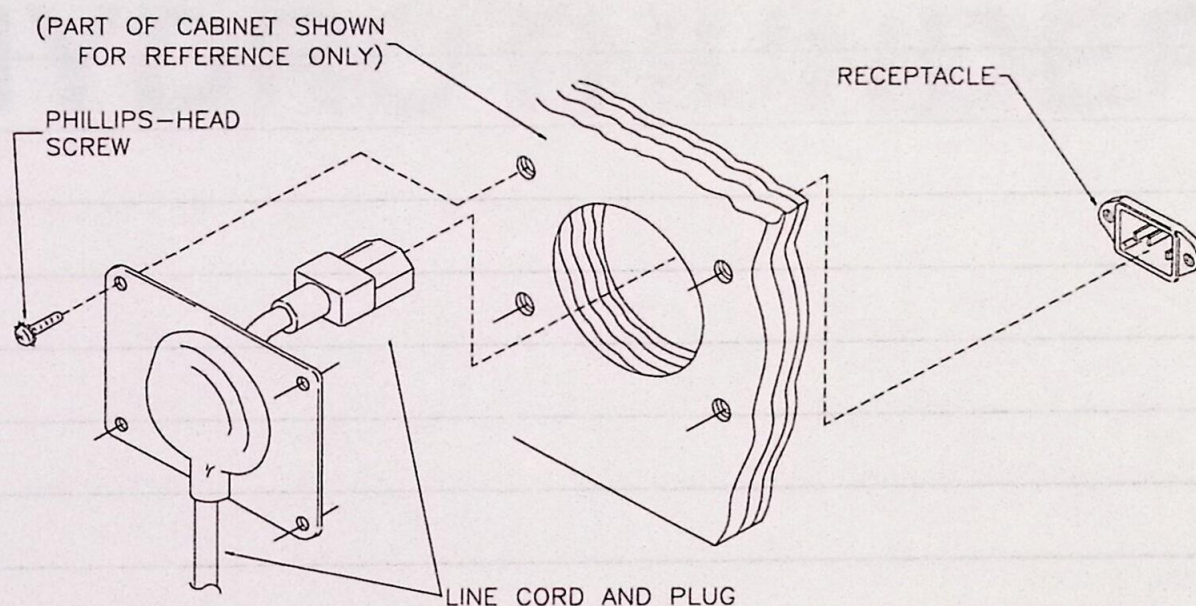
6. The pedestal assembly mounting rails are shipped bolted to the inside of the cabinet. Remove all of the 1/4-20 hex-head bolts holding the rails. Pull the rails forward (see above diagram for proper placement) and reinstall the same bolts finger tight. Do not tighten these bolts at this time, as some movement is required in the mounting rails to align holes with pedestal assembly.
7. Lift the pedestal section and move it near the cabinet, leaving enough space to attach the wiring harness. Mate each pedestal cable connector with its cabinet cable connector and press firmly to seat the contacts. Ensure that wires are not pinched during pedestal attachment.
8. Align the opening in the pedestal with the ends of the rails. Slide the pedestal forward onto extended mounting rails and align the holes. Attach pedestal assembly using 1/4-20 tamper resistant screws and large flat washers. A T27 wrench is included with the spare parts to tighten these screws firmly. Tighten the hex head bolts after the tamper resistant screws have been tightened.
9. An extra padlock may be installed to secure the rear door. A hasp is located in the spare parts bag. Remove the two lock bracket nuts from inside the cabinet, above the rear door opening. Slide the hasp onto the bolts so that it protrudes from the hole in back of the cabinet, then reinstall the nuts.



10. Unlock and remove the rear door of cabinet. Inspect cabinet interior for any signs of damage. Check all major assemblies to assure that they are mounted securely. Ensure that nothing blocks fan airflow.
11. Modify the lock plate at the top of the rear door. Remove the bolts and nuts from the lock plate, then rotate the plate so that the slot will be above the door. Reinstall the bolts and nuts and tighten firmly.



12. The power cord is with the spare parts. Remove and save four screws from the line cord cover plate at the rear of the cabinet. Match the holes on the IEC plug with the prongs in the receptacle and push firmly to seat the line cord. Hold the cord flat against the cabinet and reinstall the cover plate (the indentation should point down so that the cord exits toward the bottom of the cabinet).



#### LINE CORD INSTALLATION

13. Refer to the game's Cabinet Wiring Diagram (in another section of this manual) and check to see that all cable connectors are correctly secured. Inspect for damaged connectors. Be sure **NOT TO FORCE CONNECTORS**. Most connectors are keyed to prevent making reversed connections.
14. Plug the game into a grounded (3-terminal) AC wall outlet. Switch ON the game using the ON/OFF switch located on the upper left top of the cabinet (when viewed from the player's position). The game will power up and begin its self test. If no errors are found, the game will automatically enter its "attract" mode of operation (scenes and sounds from typical races, player's scores, messages, etc.).
15. Unlock and open the coin door. Press and hold the Begin Test button on the operator control switch panel to enter the menu system. Wait until the Main Menu screen appears on the monitor.
16. Follow the on-screen instructions to select Diagnostics, then choose Disk Tests. Perform each of the routines to verify hard disk drive operation. If no errors are found, the program should function well.
17. Return to the Diagnostics screen, then choose Switch Tests. Follow the on-screen instructions to verify that each of the controls is operational. If no errors are found, the controls should function well.
18. Return to the Diagnostics screen, then choose Sound Tests. Follow the on-screen instructions to verify that each of the speakers is operational. If no errors are found, the audio should function well.
19. Return to the Diagnostics screen, then choose Force Feedback Tests. Follow the on-screen instructions to verify that steering resistance is present. If no errors are found, the aim should be good.
20. Return to the Main Menu screen, then choose Calibrate Controls. Follow the on-screen instructions to set steering and throttle limits. If no errors are found, the controls will have the maximum accuracy.
21. Return to the Main Menu screen, then choose Start the Game. The game will automatically enter its "attract" mode of operation (scenes and sounds from typical races, player's scores, messages, etc.).
22. Insert currency or tokens and play a game. Change the volume and make any other adjustments. Install the rear door. Close and lock all doors. Tighten the leveler nuts and engage the caster locks.



## NOTES



# HYDROTHUNDER<sup>TM</sup>

## CHAPTER TWO

### OPERATION, FEATURES, AUDITS, & ADJUSTMENTS



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SERIAL NUMBER \_\_\_\_\_



## GAME OPERATION

### DESIGN PHILOSOPHY

This game uses an "Arcade Computer" to control its functions. The "Arcade Computer" is a hybrid cross between the custom game computer circuits used in most games and the personal computer found in many offices. The "Arcade Computer" uses a familiar case enclosure with a motherboard, plug-in cards, a modular power supply, disk drives, etc., but it has been optimized specifically for playing this game. This design permits improved upgrade and service access without sacrificing game ruggedness or reliability.

### PLAYER CONTROLS

#### ◆ BOOST Button

This button allows a player to begin or continue play, select tracks and boats, etc. If the Boost feature is active, this adds a burst of power (the button is illuminated when Boost is available during a race). An on-screen gauge shows exactly how much Boost fuel has been collected by a player. It goes fast!

#### ◆ THROTTLE Lever

Controls craft speed. Push up to move forward, down to back up. Stop is a detent position in between. Reverse is spring loaded, but forward speeds may be maintained without attention (cruise).

#### ◆ STEERING WHEEL

The steering wheel is used to aim the craft. It provides course condition feedback to the pilot.

#### ◆ HIGH View

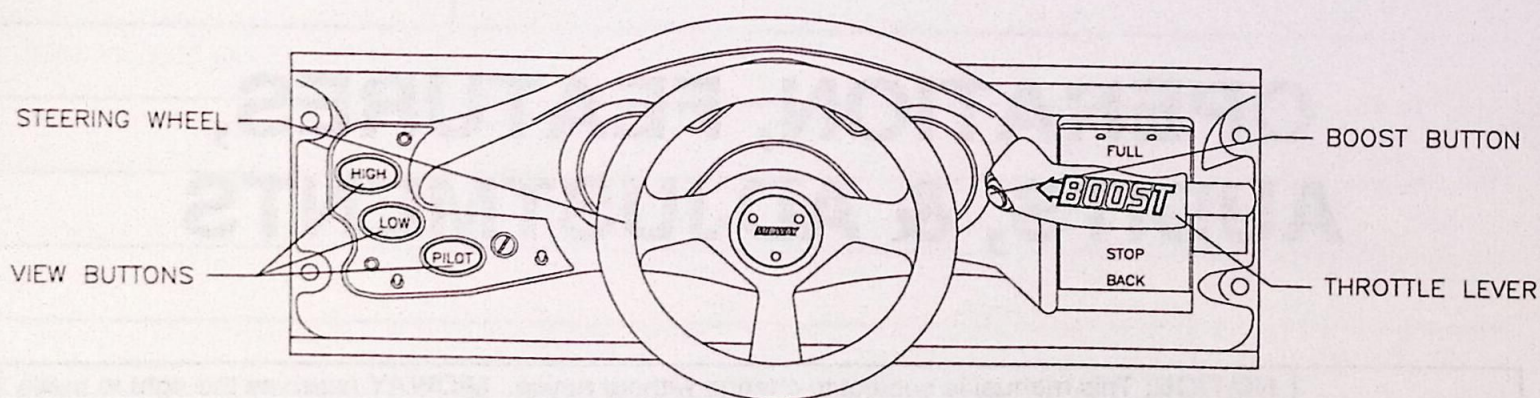
This button gives a distant aerial view of the track. The position is from above and behind the boat. This is what a helicopter camera would see.

#### ◆ LOW View

This button gives a close up aerial view of the track. The position is from above and behind the boat. This is what a boat camera would see.

#### ◆ PILOT View

This button shows the cockpit view. The position is from the driver's seat inside the boat. This is the view through the windshield as seen from normal driving perspective.



PLAYER CONTROL LOCATIONS



## OPERATOR CONTROLS

### CABINET CONTROLS

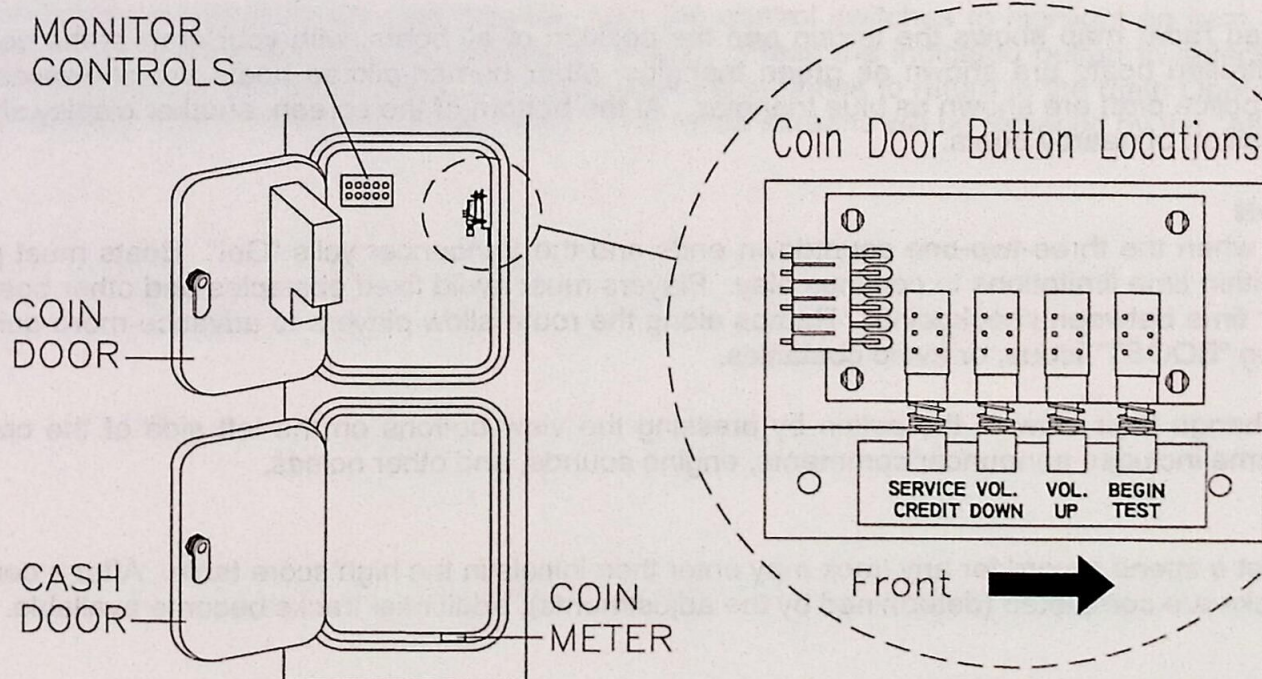
- ◆ The **DIP Switches** set some system variables. You can set other variables in the menu system.
- ◆ The **Monitor Remote Control Board** allows you to adjust the video display for optimum viewing.
- ◆ The **Cabinet POWER Switch** turns off the entire game, but does not reset game variables.
- ◆ The **Computer POWER Switch** turns off the computer. It is internally located. Use it for servicing.

### CONTROL SWITCHES

- ◆ The **TEST MODE Button** causes the game to enter the menu system. Press the TEST MODE button briefly to run automatic tests. Press and hold TEST MODE Button until the Main Menu appears. Within the menu system, the TEST MODE Button's function is described on each screen.
- ◆ **VOLUME DOWN and VOLUME UP Buttons** adjust the game sound levels. To make minor volume changes, press either button briefly. To make major changes, press and hold a button. In the menu system, VOLUME UP and VOLUME DOWN moves the item selector through each of the menus.
- ◆ The **SERVICE CREDITS Button** allots credits without changing the game's bookkeeping total. SERVICE CREDITS Button functions in the menu system are also described on each screen.



**NOTICE:** The Attract Mode volume level is separate from the Game Mode volume level. For greater profits, raise volume levels to add realism and draw attention to this game.



OPERATOR CONTROL SWITCH LOCATIONS



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## GAME FEATURES

### STARTING UP

Each time the game is first turned on or power is restored, it begins executing code out of the boot ROM. These self-diagnostic tests automatically verify and report condition of the CPU and the game hardware. If any of the individual tests fails, the game may display an error message.

Once all Power-up tests are complete, the game goes into the "attract mode". Scenes and sounds from a typical game alternate with previous high scores in an endless pattern until game play starts.

Insert currency to start the game. Players select a boat and a track. Play begins after a countdown period. The game will progress until time is exhausted or play is over. If no more play is required, the game automatically returns to the "attract mode".

**GAME RULES** *Play instructions are found on the information panel over and under the video monitor.*  
**INDIVIDUAL PLAY**

Insert currency to start the game. Select a boat and a track. Additional game information appears on the screen when needed. Individual statistics are shown periodically during the race and its end.

### PLAYER CHOICES

Any boat can be used on any track. Each boat handles and performs differently. Players will learn which boats are best for a given track and driving style. Press one of the VIEW buttons to select more boats.

### CONTROLLING THE BOAT

The steering wheel and throttle control the boat. The steering wheel directs the boat while the throttle sets its speed. A "BOOST" button on the throttle gives an extra burst of power. This button flashes when the additional "BOOST" is available. In order to use "BOOST," players must collect "BOOST" icons along a track by steering directly under them. A gauge shows exactly how much "BOOST" power is available.

### INDICATORS

On-screen indicators give the players information about their boat and those of competitors. Across the top of the screen are numeric indicators for elapsed time, time remaining to pass the next checkpoint, and race position. Gauges show engine R.P.M., vehicle speed, and "BOOST" fuel remaining.

### DISPLAYS

A superimposed radar map shows the terrain and the position of all boats, with your craft at the center. Computer-controlled boats are shown as green triangles, other human-piloted boats are shown as red triangles, and police craft are shown as blue triangles. At the bottom of the screen, another display shows the relative position of nearby boats.

### GAME ACTION

Action begins when the three-two-one countdown ends and the announcer yells "Go!" Boats must pass checkpoints within time limitations to continue play. Players must avoid fixed obstacles and other boats to decrease their time between checkpoints. Ramps along the route allow players to advance more quickly, collect hovering "BOOST" icons, or avoid obstacles.

Players can change their view of the action by pressing the view buttons on the left side of the control panel. The game includes announcer comments, engine sounds, and other noises.

### SCORING

Players who set a speed record for any track may enter their initials in the high score table. After a certain number of tracks are completed (determined by the adjustments), additional tracks become available.



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## MENU SYSTEM

### SYSTEM OVERVIEW

A series of on-screen menus present game variables and diagnostics. The Main Menu screen allows the operator to view information, make changes, or verify equipment operation. Each Sub Menu screen displays one specific group of choices. Detail Menus present data or run the required tests. You must be at the Detail Menu level to detect errors, make changes, or activate tests. The operator control switches are used to move through the menus, select items, and start or stop particular routines.

Each time the game is turned on or switched from normal play mode to the menu system and back, the startup routine is activated. These basic system checks run automatically; their purpose is to detect those faults that would prevent the game or the menu system from operating properly. Messages appear on the screen as each item runs, including any error information. Successful startup takes less than one minute to complete. Write down any messages or information before proceeding to the menus or game play.

### SCREEN LAYOUT

Each menu screen is different, but the material presented stays in the same physical location each time.

The color bar at the top center of each screen displays the current menu title.

The center of the screen shows data (menu items, video signals, statistics, reports, etc.)

The bottom of the screen displays messages (explanations, control functions, revision levels, etc.)

### ORGANIZATION

The operator must activate and deactivate the menu system manually using control switches.

The Main Menu screen items are divided into categories: tests, statistics, audits, adjustments, etc.

Tests can verify proper operation of the equipment assemblies one at a time.

Other items allow operators to assess game performance and customize or return to factory defaults.

Sub Menu screen items present the operator choices within a category. Some items have no Sub Menu while others may have more than one. It is always possible either to return to the previous menu or go on to the next menu. The instructions are usually listed at the bottom of each individual screen.

Detail Menu screen items display specific information. The operator must command the system to get results or to make changes. There is always a way to go back to the previous menus from this screen.

Switch functions are listed on each screen. Use the control switches to highlight an item on any menu. *Only one highlighted item can be selected at a time.* Press the indicated button to select a highlighted item. To return the game to normal play mode, use the switches to return to the main Operator Menu and select START THE GAME, then press TEST. The menu screens will be replaced by the "Attract" scenes.



## OPERATOR MENU



### MAIN OPERATOR MENU SCREEN

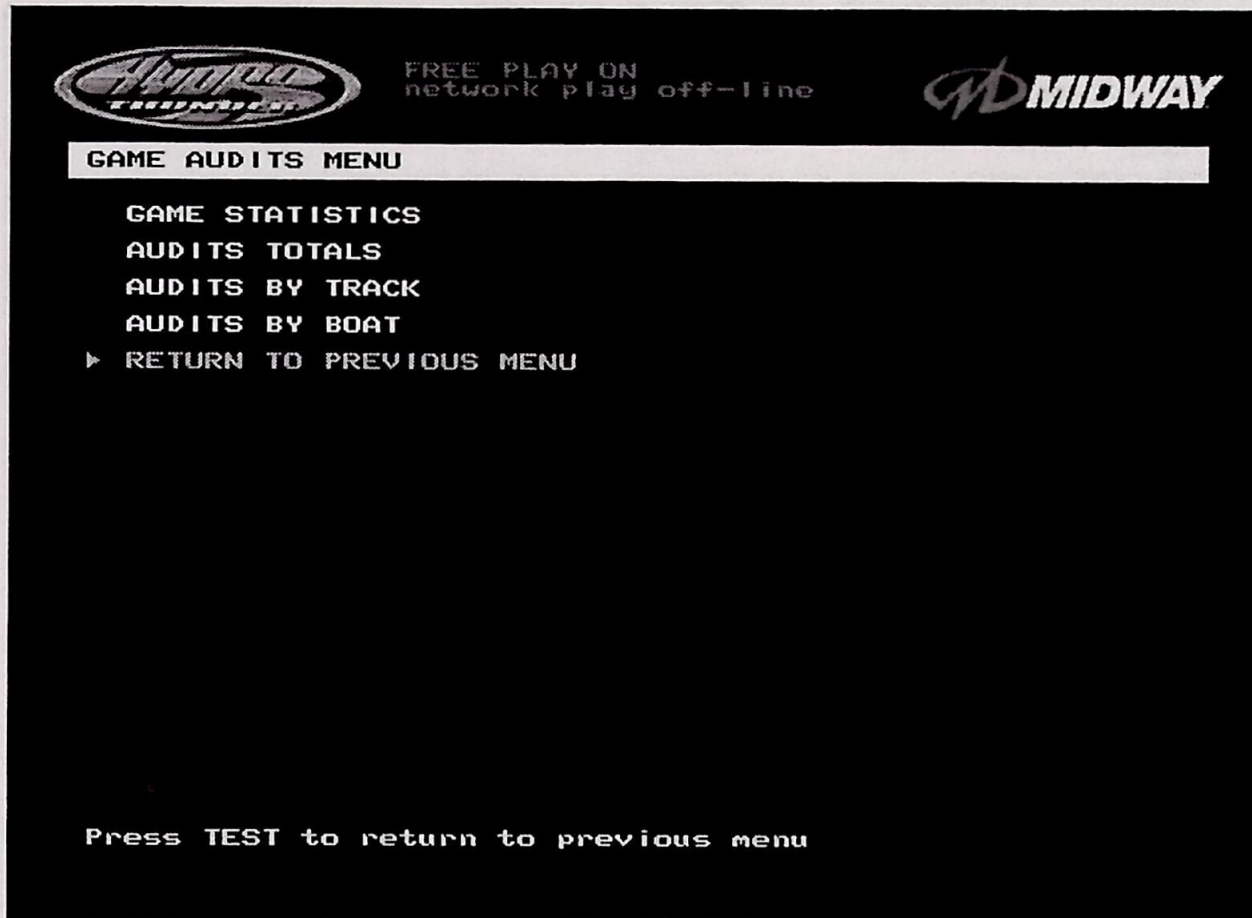
The **Operator Menu** is the top-level screen of the Menu System. It presents the general categories of operator selectable items. All subsequent screens show more detail than this one. This screen does not permit changes. This is the only menu that allows the operator to exit from the menu system by choosing **Start the Game**.

Unlock and open the door to use the operator control switches. Press the TEST button to enter the **Operator Menu** screen. Use the **Volume Up** and **Volume Down** buttons to move up or down through the list of items. Follow the on-screen instructions to continue to other menu screens.

The top center area of the screen between the game and manufacturer's logos displays information about major variables that affect game operation. **FREE PLAY ON** indicates that the game will start without inserting currency or tokens). **Network play off-line** indicates that this game is not linked to another at this time. These items may be changed from the **Adjustments** menus.



## GAME AUDITS



### GAME AUDITS MENU SCREEN

The **Game Audits Menu** provides the operator with options for various summaries of the game statistics and audits. Detailed reports give statistics based on player selections and performance.

To view a report, use the operator control switches to select the **Game Audits Menu** and a specific report. Press TEST to activate the report. Follow the on-screen instructions to continue to other menu screens.

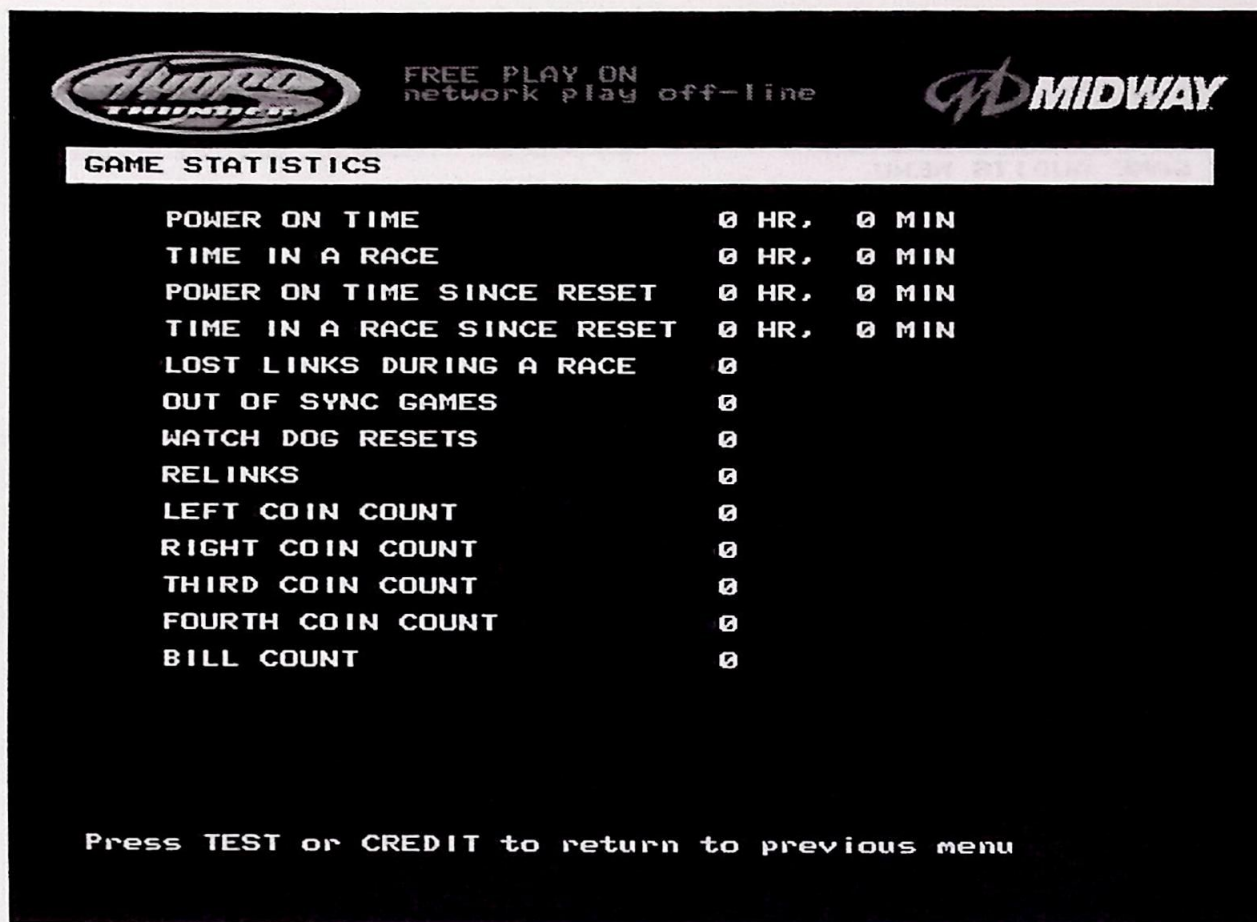
Use the information in these reports to keep records of the game's popularity and earnings. The operator may also analyze favorite tracks, most frequently used boats, and other statistics. These screens report information but do not permit changes.

Examine and record all game audit values before doing service or making repairs on this game.

**NOTE:** Use caution when clearing audit information. Once data has been cleared, it cannot be restored. Use the "Save Audits to Floppy Disk" option on the **Game Utilities Menu** to save the data for analysis. To clear these statistics or audits, go to the **Game Utilities Menu**.



## GAME STATISTICS



### GAME STATISTICS SCREEN

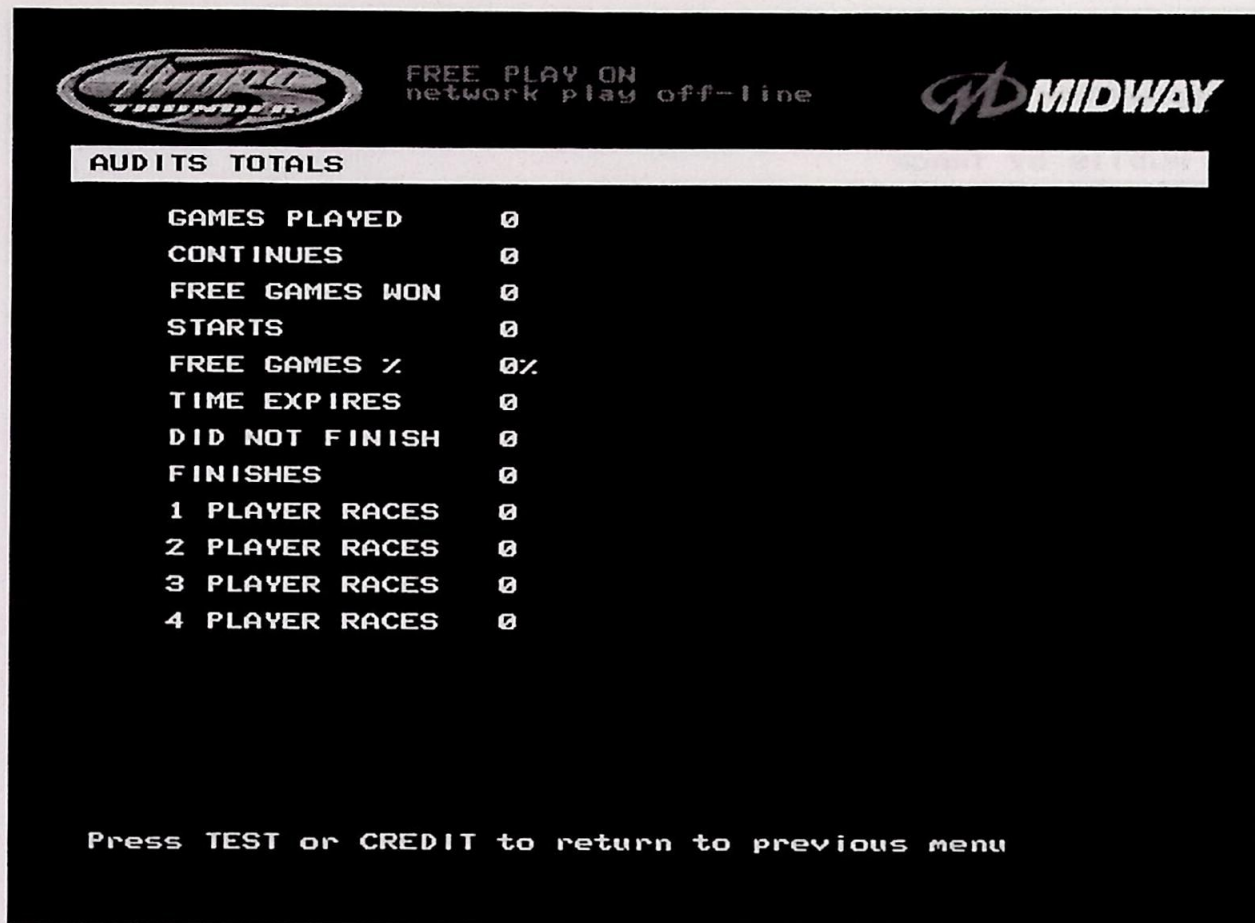
The **Game Statistics** report displays general information about coin counts and game usage. Use the operator control switches to select **Game Statistics** from the **Game Audits** menu. Press TEST to enter the **Game Statistics** display. This screen reports information but does not permit changes.

The **Coin Count** and **Bill Count** items permit the operator to assess currency collection. The other items present information on game operation.

**Reset**, **link**, and **sync** statistics are measures of the game software's ability to recover from conditions that adversely affect game play.



## AUDITS TOTALS



### AUDITS TOTALS SCREEN

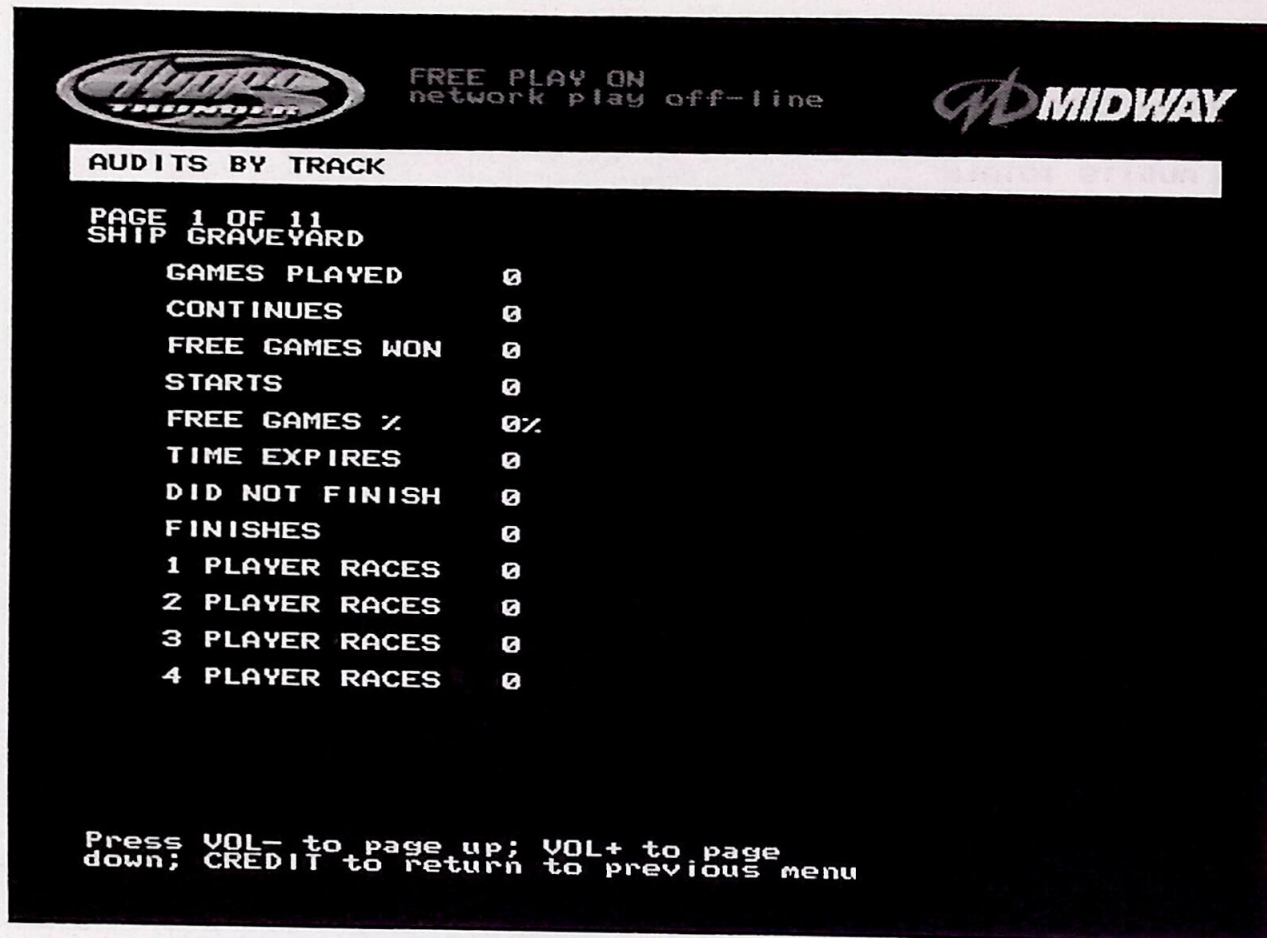
The **Audits Totals** display additional information about player statistics and ability. This information assists the operator in understanding game usage and profitability. Use the operator control switches to select **Audits Totals** from the **Game Audits** menu. Press TEST to enter the **Audits Totals** display. This screen reports information but does not permit changes.

**Free Games Won** remains at zero if the bonus and award options are set to **OFF**. Refer to the **General Adjustments Menu** for the bonus and award options settings.

**Two-, Three-, and Four Player Races** remain at zero if no other games are linked to this one.



## AUDITS BY TRACK



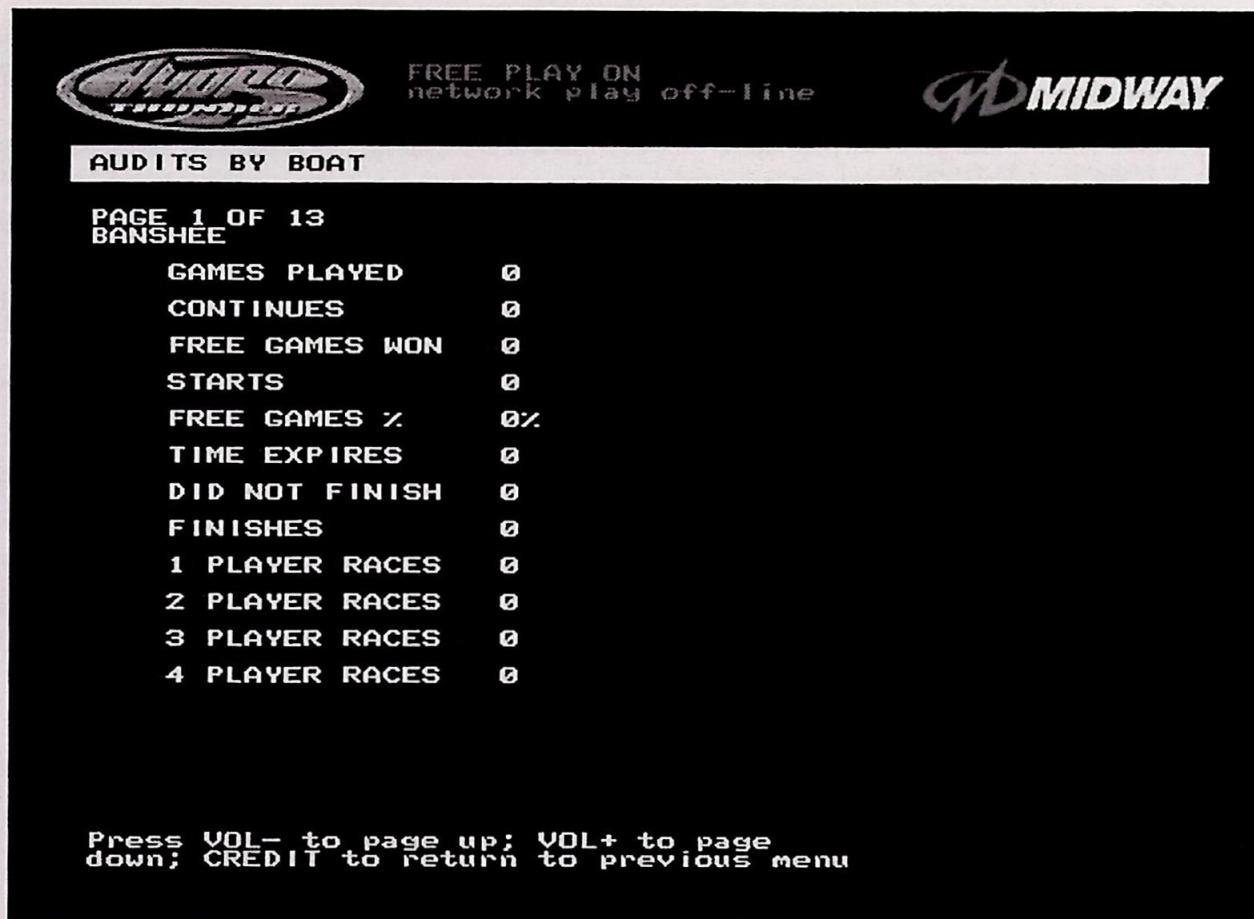
### TYPICAL AUDITS BY TRACK SCREEN

The **Audits by Track** report gives operators more specific information about player choices and ability. Use the operator control switches to select **Audits by Track** from the **Game Audits** menu. Press TEST to enter either display. This screen reports information but does not permit changes.

There are several pages of these audits. The name of the track appears at the top of the page. Press the VOLUME UP or VOLUME DOWN buttons to move through these pages.



## AUDITS BY BOAT



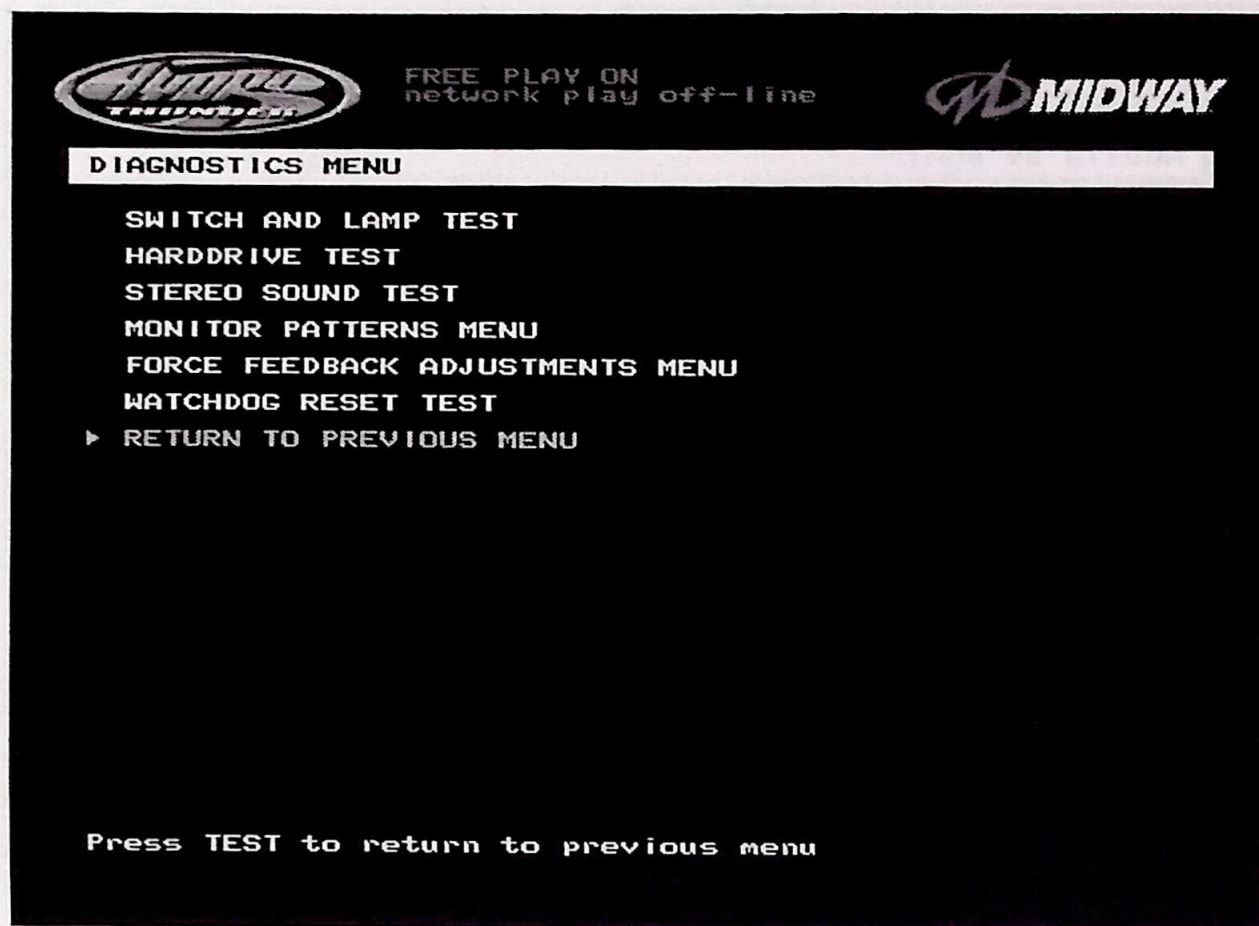
### TYPICAL AUDITS BY BOAT SCREEN

The **Audits by Boat** report gives operators more specific information about player choices and ability. Use the operator control switches to select **Audits by Boat** from the **Game Audits** menu. Press TEST to enter either display. These screens report information but do not permit changes.

There are several pages of these audits. The name of the boat appears at the top of the page. Press the **Volume Up** or **Volume Down** buttons to move through these pages.



## DIAGNOSTICS



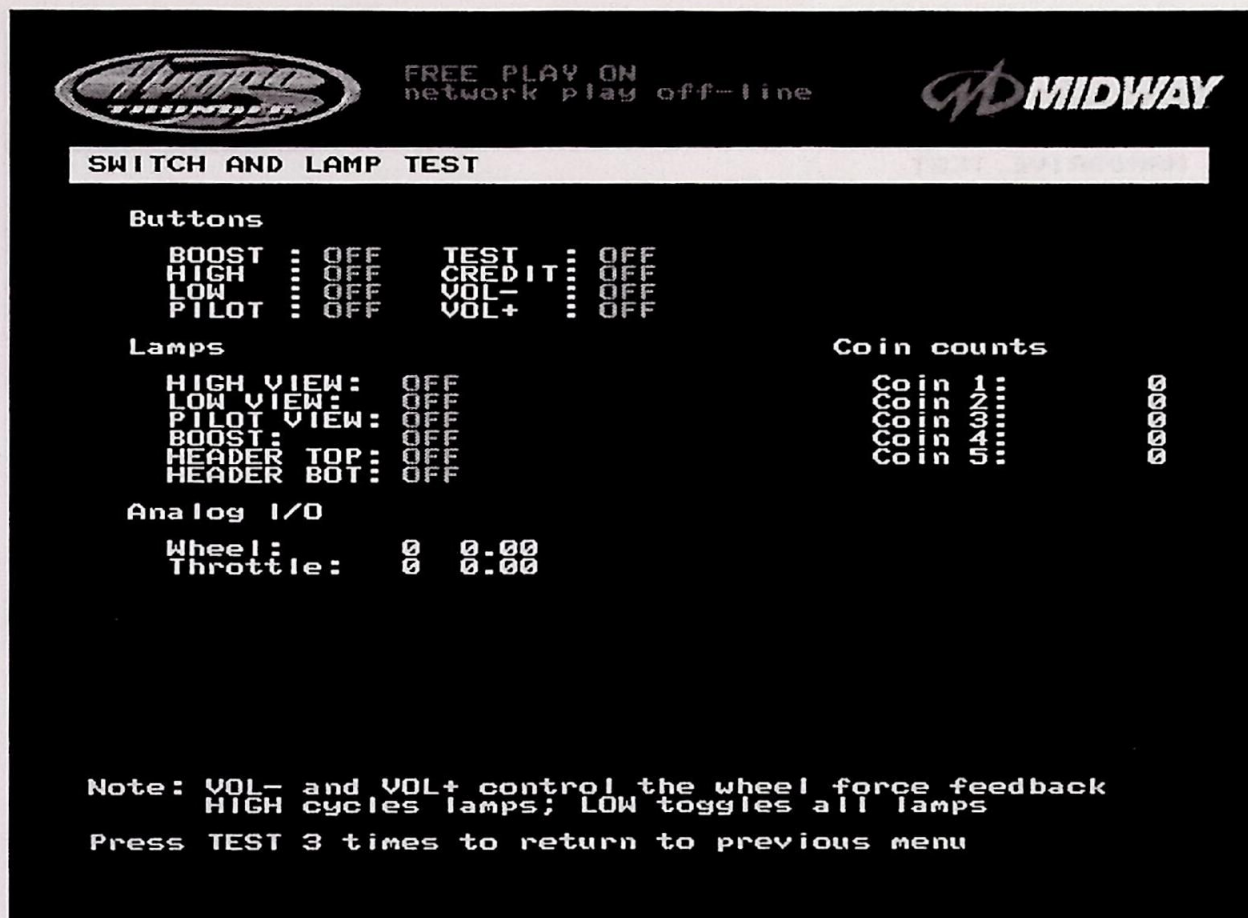
### DIAGNOSTICS SUB MENU SCREEN

These tests allow the operator to verify the electrical and electronic condition of the game. This screen does not permit changes.

To select these tests, use operator control switches to select the DIAGNOSTICS MENU and press TEST to activate it. The screen displays the sub menu. Use the same steps to activate any one of the items listed. Follow the on-screen instructions to continue to other menu screens.



## SWITCH AND LAMP TEST



### SWITCH AND LAMP TEST SCREEN

Use the operator control switches to select the **Switch and Lamp Test** and press the TEST button. This screen reports information but does not permit changes.

Activate each switch and the indicator on the screen changes state. Release the switch and the indicator returns to its previous normally open or closed condition. Switches may be tested in any combination. These Switch Tests are used to verify crossed wires, intermittent conditions, and stuck switches.

The **Buttons** tests include the player control switches and operator control switches. Activating any of these switches causes the indicator on screen to change from OFF to ON and from gray to green. Each button change should be exactly duplicated by a single indication on the menu screen.

The Coin and Cabinet Switches are shown on the screen without regard for their actual game location. Each switch change should be exactly duplicated by a single indication on the menu screen.

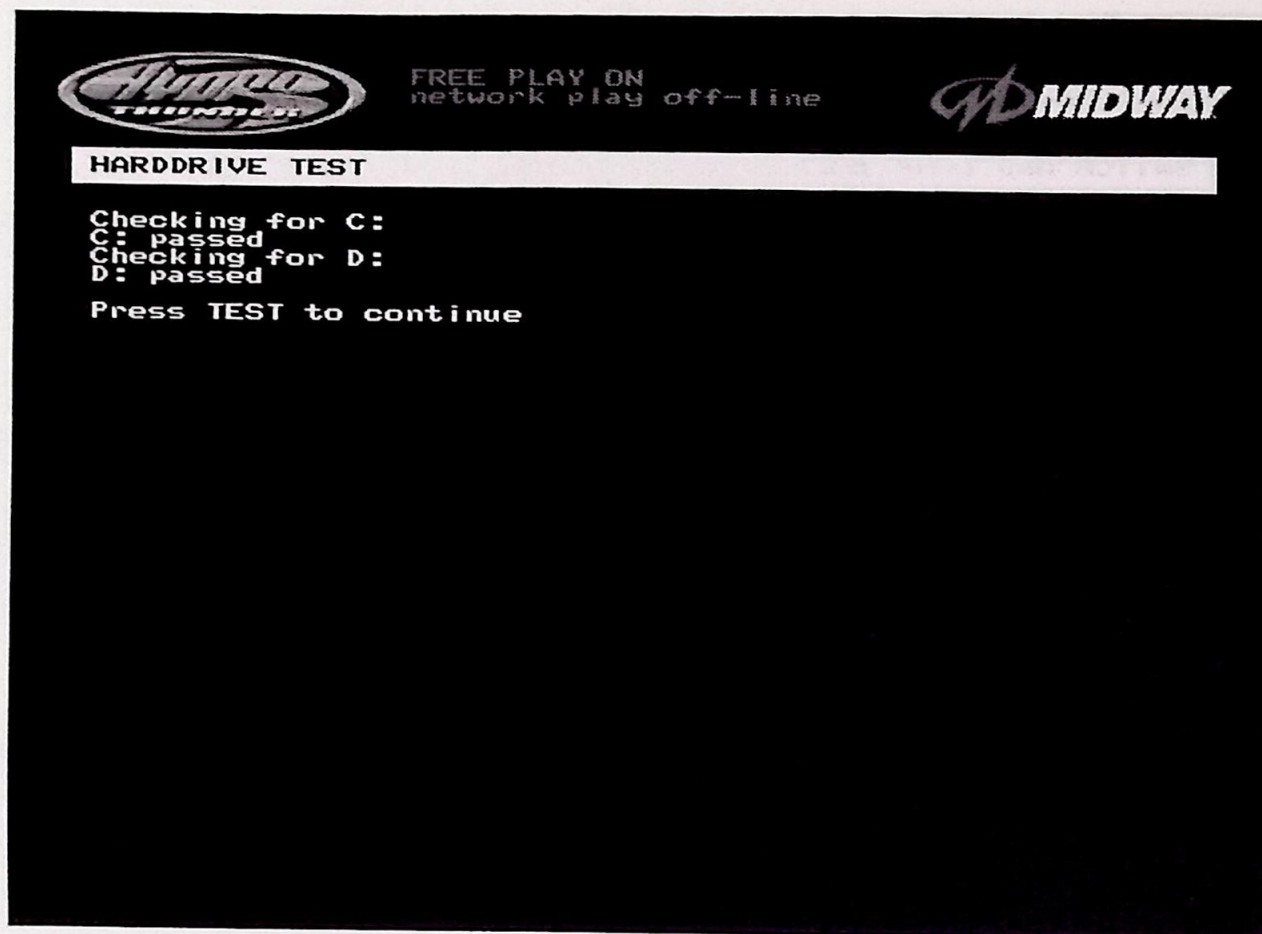
The **Lamps** tests indicate the state of each of the lamps within control panel and overhead linking sign, or "header" (if installed). Press the LOW button to activate all of the lamps simultaneously, or the HIGH button to cycle the lamps in order. The HEADER TOP and HEADER BOT lamp tests have no effect unless a header or leader light is installed on the cabinet.

The **Analog I/O** test displays a value relative to the travel limits of the steering wheel or throttle indicating the current position of each control. **Wheel** position varies between 0 (full left) and 255 (full right). **Throttle** position varies between 0 (full back) and 255 (full forward).

The **Coin Counts** display the total number of coins deposited through each mechanism. Insert currency or tokens to perform these tests.



## HARD DRIVE TEST



### HARD DRIVE TEST SCREEN

The **Hard Drive Test** verifies the functioning of the Hard Disk Drive Assembly.

Highlight the test by using the operator control switches to select the option; then press **TEST** to begin. This screen reports information but does not permit changes.

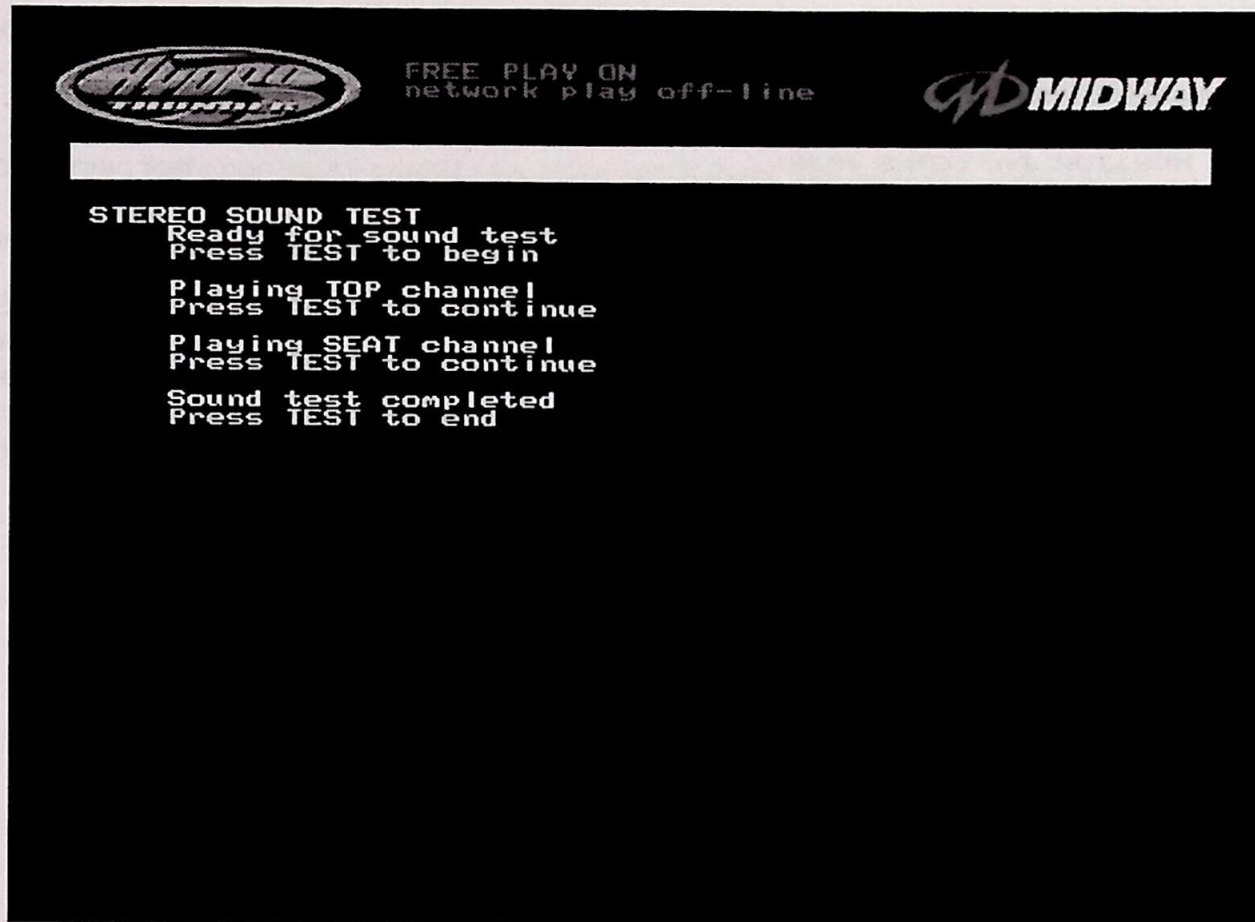
The Hard Drive Test verifies the existence of the data necessary for the game to operate. Each test should return a "passed" result. Other results may indicate a problem with the hard disk drive.

There is a single hard disk drive unit in this game. It is partitioned into two virtual drives, C: and D:. The test should report "passed" for both drives for the game to work properly.

Press **TEST** to exit the Hard Drive Test.



## STEREO SOUND TEST



### STEREO SOUND TEST SCREEN

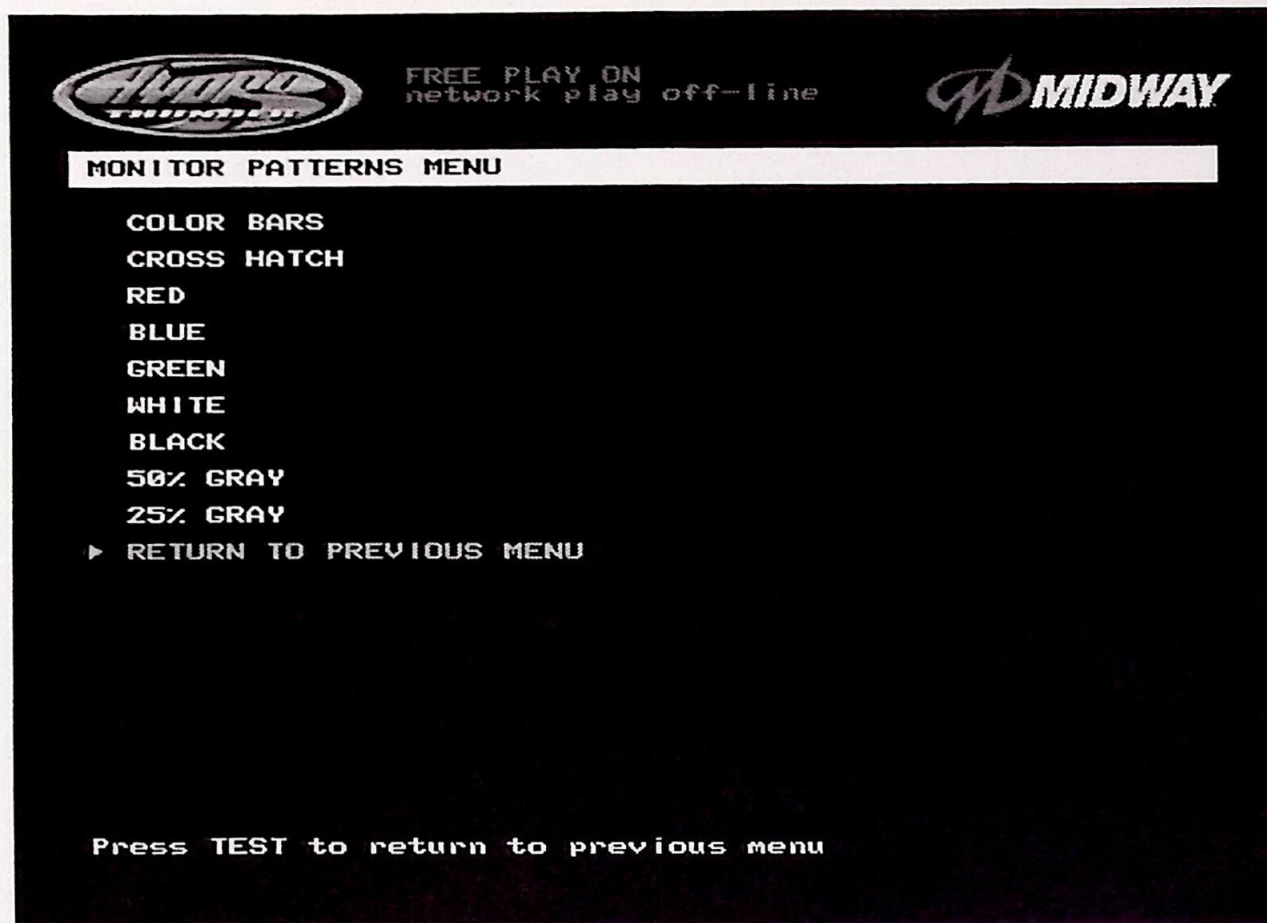
The **Stereo Sound Test** verifies the operation of the stereo sound hardware and cabinet speakers. *Increase the master volume level before beginning this test.* Use the operator control switches to select this test and press TEST to activate it. This screen reports information but does not permit changes.

Press the TEST button when prompted by on-screen instructions to check each speaker and the game sound hardware. Listen to the audio signals from the speakers listed on the screen. There should be little or no sound coming from other speakers during each test. Use these tests to find crossed connections, incorrect phase, rattles, vibration, distortion, etc.

Press the TEST button to exit the Stereo Sound Test.



## MONITOR PATTERNS TEST



### MONITOR PATTERNS SUB MENU SCREEN

*NOTE: This game uses a medium resolution monitor. The increased resolution means that more video information is displayed on the screen than with standard resolution monitors. Use of an industrial grade degaussing coil is recommended before any corrections to monitor adjustments are attempted.*

The Monitor Patterns routine provides test screens to verify monitor performance or make adjustments. To begin the tests, use the operator control switches to choose **Monitor Patterns Menu** from the **Diagnostics Menu** screen and press TEST to activate the sub-menu. Select a test from the sub-menu and press TEST to activate it. Press TEST once again to return to the **Monitor Patterns** sub menu.

**Color Bars** fills the screen with shades of colors to verify red, green, blue and white level dynamic adjustments. Each color bar should appear sharp, clear, and distinct from bars on either side.

There are 31 levels of intensity displayed in each of the color bars. Incorrect adjustment can cause detail to be missing at the top or bottom of a color bar. Set the monitor controls so that the maximum number of levels is visible in every bar.

The Color Bars screen helps to adjust the monitor brightness and contrast.

**Cross Hatch** fills the screen with a grid and a series of dots. The grid and the dots should be completely white, with no fringes or parallel images. The lines should be straight and the dots round.

Consult the service literature from the manufacturer of the monitor for more detail on these adjustments.

The Crosshatch Patterns assists in verifying the monitor convergence, linearity, and dynamic focus.



## MONITOR PATTERNS TEST (continued from previous page)

**Red, Blue, and Green Color Screen** tests fill the screen with 100% of the chosen color at normal intensity. Each screen should be absolutely uniform from top to bottom and side to side. No retrace lines or noise should be visible.

The Color Screen tests can verify monitor intensity, black level, blanking and color purity.

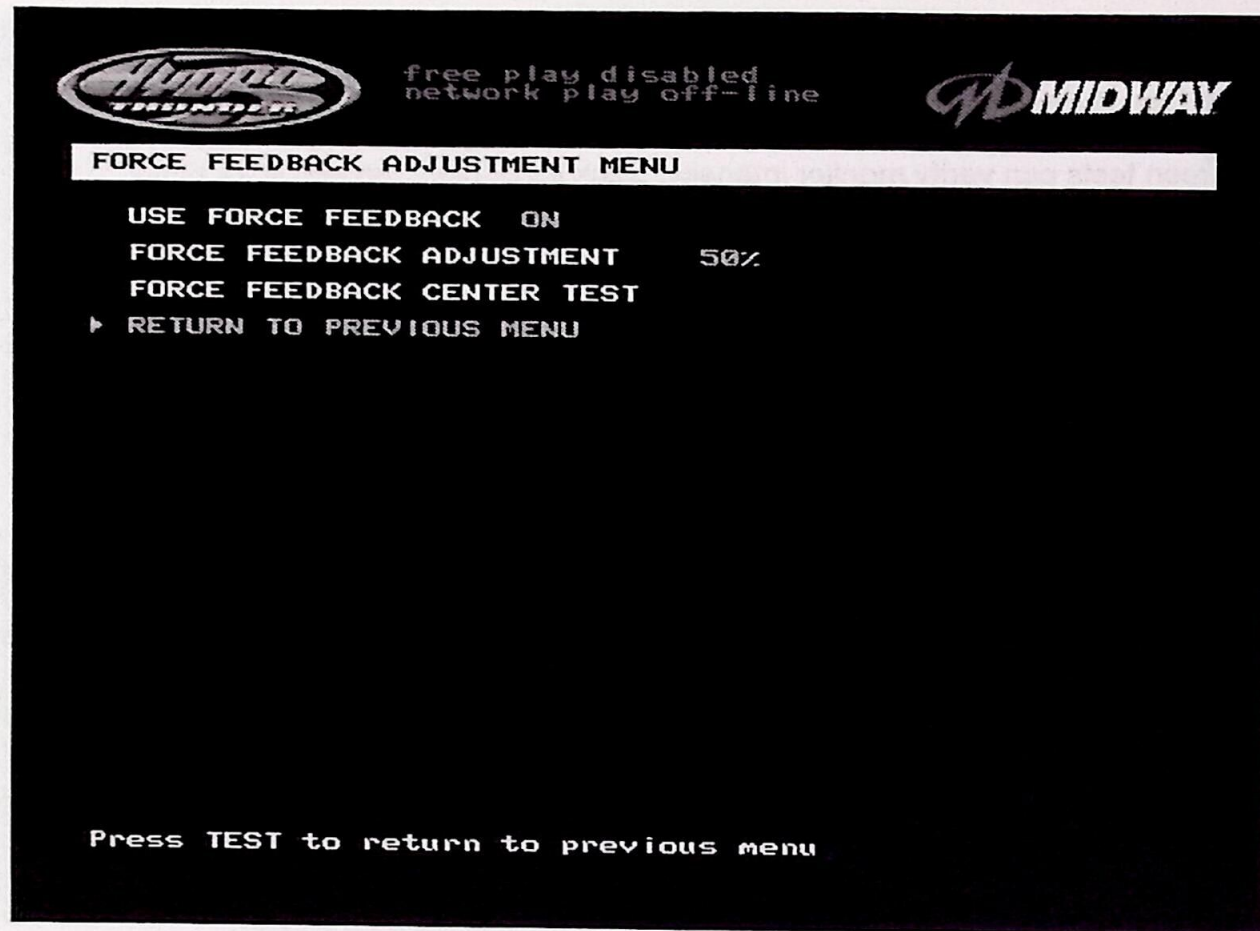
Color Screens may not hold their uniformity if the monitor degaussing circuit is defective.

**White, Black, 50% Gray, and 25% Gray Screens** fill the screen with black, gray or white at various intensities. The screens should be uniform with no color tints or distortion. No retrace lines or noise should be visible.

If any of the tests shows a need for adjustment, use the proper controls on the Video Monitor.



## FORCE FEEDBACK ADJUSTMENTS



### FORCE FEEDBACK ADJUSTMENT MENU SCREEN

The **Force Feedback Adjustment Menu** allows operators to set the use and intensity of feedback from the steering wheel motor. Select the test or adjustment with the operator control switches and press TEST to activate it. This screen permits changes to the existing values.

The **Force Feedback Adjustment** ranges from 0% (minimum) to 100% (maximum) with 50% as the factory default setting. Use a higher amount of force for players with greater upper body strength. Younger players may be more comfortable with lower force settings.

The **Force Feedback Center Test** checks the functioning of the steering wheel motor drive circuits. Select this item and move the steering wheel to any position. The wheel must automatically return to its center position as soon as it is released. If it does not do this, the boat will not respond properly.



## WATCHDOG RESET



### WATCHDOG RESET TEST CONFIRMATION BOX

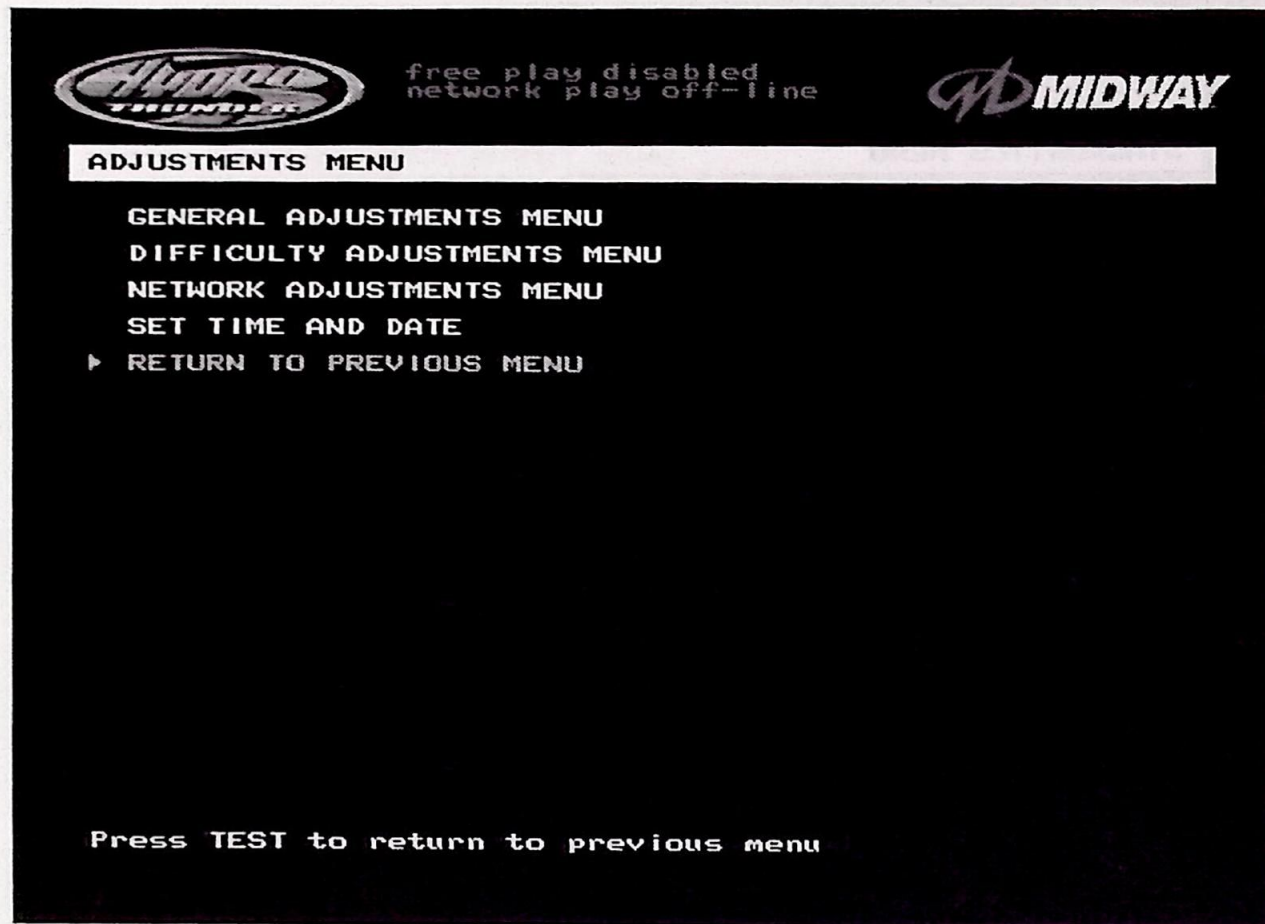
The **Watchdog Reset Test** checks the function of the game's watchdog circuit by causing a forced reset. Use the operator control switches to select the **Watchdog Reset Test**, then press TEST to activate it. This test is similar to the restart command available on many personal computers.

**Note:** Use caution when performing a Watchdog Reset Test. Although game information should not be affected, audit data could be changed. Once data has been changed, it cannot be restored. Use the "Save Audits to Floppy Disk" option on the **Game Utilities Menu** to save the data for analysis.

When the operator chooses the **Watchdog Reset Test**, a confirmation box appears superimposed on the screen (as shown above). Select YES to reset the game or NO to return to the **Diagnostics Menu**. Upon reset, the screen blanks and the game starts up again. Note and record any messages that occur during this startup sequence.



## ADJUSTMENTS MENU



### ADJUSTMENTS MENU SCREEN

The **Adjustments Menu** allows operators to set game and player variables. Use these screens to optimize game performance and earnings.

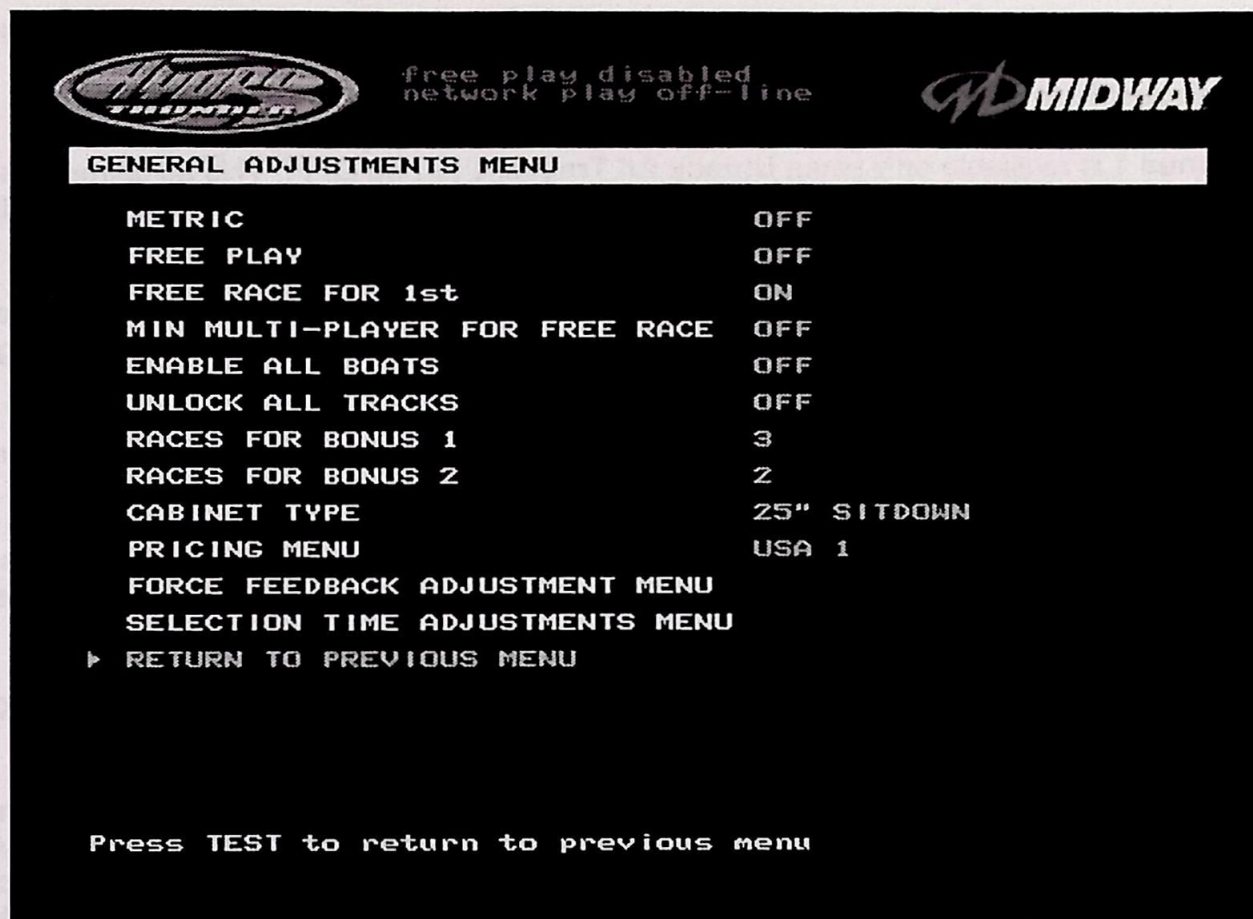
The **General Adjustments** include pricing, game variables and cabinet type variables. Select these items to set player incentives, the cost of playing, and the size of game equipment.

The **Difficulty Adjustments** set the level of game difficulty. These adjustments can optimize the game's characteristics to best suit the needs of players.

The **Network Adjustments** control variables related to linking. These items are required to establish the identity of all cabinets in a network. These adjustments are transparent to the players.



## GENERAL ADJUSTMENTS MENU



### GENERAL ADJUSTMENTS MENU SCREEN

The **General Adjustments Menu** contains options to control the cost and type of play. It also sets the cabinet type game display and measurement system. Select a variable with the operator control switches. Use the VOLUME UP and VOLUME DOWN buttons to change a variable. Certain items have sub-menus. This screen permits changes to the existing values.

**Metric** sets the measurement system for display on game screens. Set this option to ON to display speed in kilometers per hour. Set this option to OFF to display speed in miles per hour. Factory default is OFF.

**Free Play** determines whether the game accepts currency or tokens for play, or allows operation without cost. Set this option to ON for free play. Set this option to OFF for paid play. Factory default is OFF.

**Free Race for 1<sup>st</sup>** permits a free game incentive for players who finish a race in first place. Set this option to ON to award a free race to a first-place finisher. Set this option to OFF to eliminate the free race award. Factory default is ON.

**Min Multi-Player For Free Race** sets the minimum number of players needed to activate the free race award for a first-place finish. The choices are OFF, two, three, or four players. Factory default is OFF. Use this feature to encourage players to participate in linked races.

**Enable All Boats** determines whether all boats are available for player selection at the start of a race. Set this option to OFF to hide certain boats from first time players. Set this option to ON to enable players to choose from all possible boats at all times. Players can override this option to choose from all boats by pressing any of the view buttons during the boat selection screen. Factory default is OFF.



## GENERAL ADJUSTMENTS MENU (continued)

**Unlock All Tracks** enables or disables certain tracks until players finish a certain number of races. The hidden tracks are revealed as "bonus" tracks. Set this option to OFF to hide the "bonus" tracks. Set this option to ON to enable players to choose from all tracks at all times. Factory default is OFF.

**Races for Bonus 1** is available only when **Unlock All Tracks** is turned OFF. This adjustment sets the number of races a player must complete to unlock the first of the hidden tracks. The range of adjustment is from 1 to 8 races. Factory default is 3.

**Races for Bonus 2** is also available only when **Unlock All Tracks** is turned OFF. This adjustment sets the number of races a player must complete to unlock the second of the hidden tracks. The range of adjustment is from 1 to 8 races. Factory default is 2.

**Cabinet Type** identifies the cabinet size. Set this option to match the video monitor, either 25" or 39". Factory default is determined by setting DIP SWITCHES on a circuit board inside the cabinet.

**Pricing Menu** allows the operator to choose from several pre-determined currency combinations. Select this item and press TEST to change the cost of starting and continuing a game. This option is disabled if **Free Play** is ON. Factory default is USA1.

**Force Feedback Adjustment Menu** allows changes to the amount of feedback from the steering wheel. Refer to **Force Feedback Adjustment** description on a previous page.

**Selection Time Adjustments Menu** permits operators to set the amount of time for a player to make selections at the beginning or end of play. Longer than necessary times cut into the number of games that can be played in one day. Slower or first time players may not be able to read information and act with very short times. When this adjustment is chosen, another menu screen presents the following items:

**Track Select Time** and **Boat Select Time** set the limits for player decisions at the beginning of a race. The range of adjustment for each item is from 10 to 60 seconds. Factory defaults are 15 seconds.

**High Score Time** and **Continue Time** set the limits for player decisions at the conclusion of each race. The range of adjustment for each item is from 10 to 60 seconds. Factory default for **High Score Time** is 20 seconds. Factory default for **Continue Time** is 17 seconds.



## PRICING MENU



### PRICING MENU SCREEN

The **Pricing Menu** contains options for selecting standard and custom currency combinations. Use the operator control switches to select **Pricing Menu** from the **General Adjustments Menu** and press TEST.

**Select Custom Pricing** allows the operator to set coinage and credits options manually. Use this item to set up combinations not found in the standard listing. This screen permits changes to the existing values.


**Select Standard Pricing** allows the operator to select from several standard price schemes. The most commonly used currency requirements to start and to continue games are ready for operator selection. This screen permits changes to the existing values.

**View Current Pricing** displays the present currency and credit settings. Choose this item to review the active game price scheme. This screen reports information but does not permit changes. Use either of the Select Pricing options to make changes, then return to this screen to verify the settings.


**Reset to Defaults** returns the price settings to factory defaults. Choose this item to return all variables to their original values. This screen permits changes all of the existing values at one time.



## PRICING SUBMENUS



free play disabled  
network play off-line




**SELECT CUSTOM PRICING**

CUSTOM PRICING	OFF
LEFT UNITS	1
RIGHT UNITS	1
CENTER UNITS	0
EXTRA UNITS	0
DBV UNITS	4
UNITS PER CREDIT	1
UNITS PER BONUS	0
MIN UNITS	0
CREDITS TO START	2
CREDITS TO CONTINUE	2
COINS PER BILL	4
SHOW CREDIT FRACTIONS	ON
LEFT COIN COUNT	1
RIGHT COIN COUNT	1
CENTER COIN COUNT	0
EXTRA COIN COUNT	0
DBV COIN COUNT	4
CURRENCY	DOLLAR


▶ RETURN TO PREVIOUS MENU

Press TEST to return to previous menu

## TYPICAL CUSTOM PRICING MENU



FREE PLAY ON  
network play off-line



**SELECT CONTINENT**

NORTH AMERICA

SOUTH AMERICA

EUROPE A2H

EUROPE I2Z

ASIA

AUSTRALIA

▶ RETURN TO PREVIOUS MENU

Press TEST to return to previous menu

## STANDARD PRICING MAIN MENU



# PRICING SUBMENUS (continued)



FREE PLAY ON  
network play off-line




**CHOOSE TABLE FOR NORTH AMERICA, USA**

▶ USA 1	LEFT UNITS	1
USA 2	RIGHT UNITS	1
USA 3	CENTER UNITS	0
USA 4	EXTRA UNITS	0
USA 5	DBV UNITS	4
USA 6	UNITS PER CREDIT	1
USA 7	UNITS PER BONUS	0
USA 8	MIN UNITS	0
USA 9	CREDITS TO START	2
USA 10	CREDITS TO CONTINUE	2
USA 11	MAX CREDITS	32
USA 12	COINS PER BILL	4
USA 13	SHOW CREDIT FRACTIONS ON	
USA ECA	LEFT COIN COUNT	1
	RIGHT COIN COUNT	1
	CENTER COIN COUNT	0
	EXTRA COIN COUNT	0
	DBV COIN COUNT	4
	CURRENCY	DOLLAR


RETURN TO PREVIOUS MENU

Press TEST to execute this command

## TYPICAL STANDARD PRICING SUB-MENU



FREE PLAY ON  
network play off-line



**VIEW CURRENT PRICING**

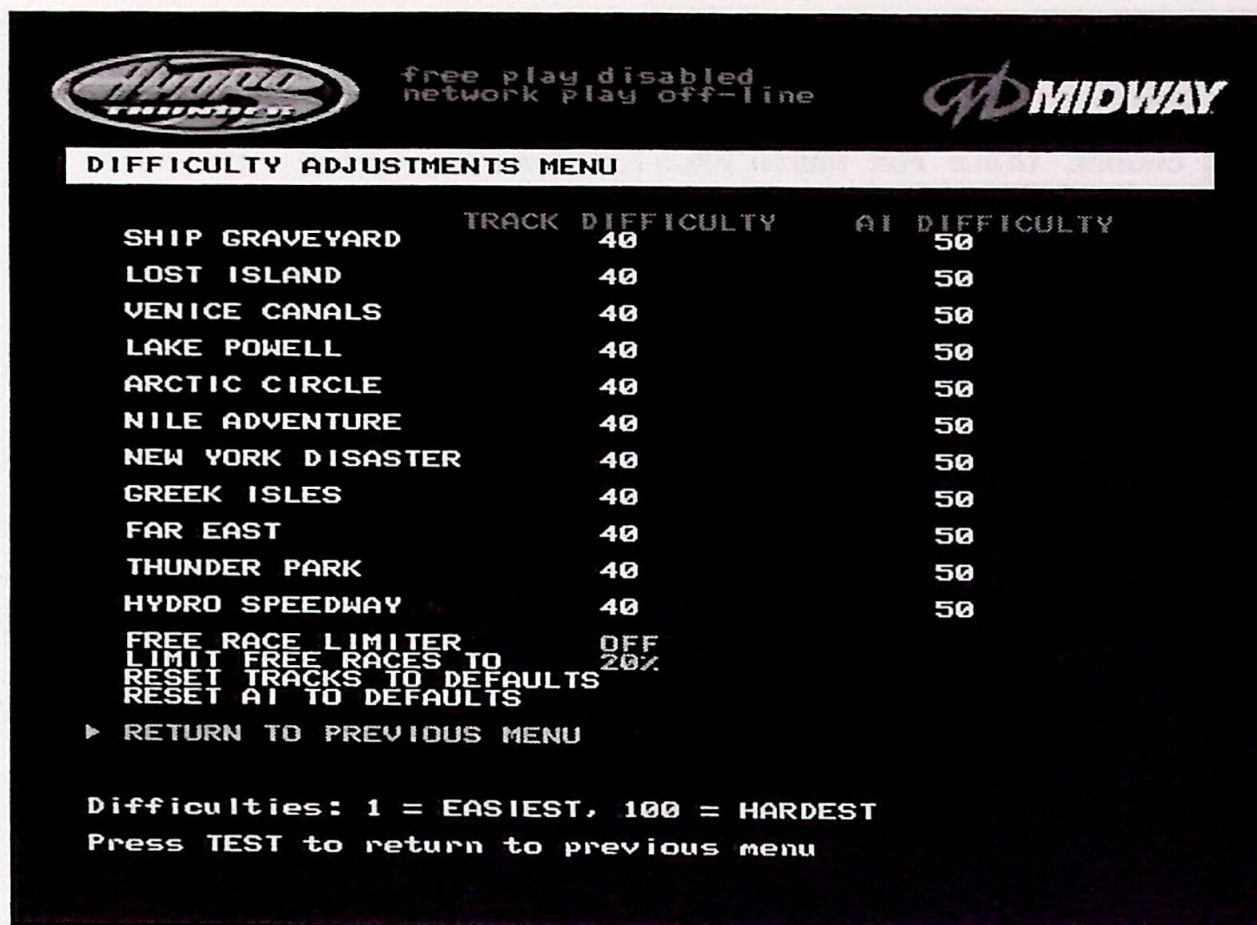
CURRENT PRICING:	USA 1	
LEFT UNITS	1	
RIGHT UNITS	1	
CENTER UNITS	0	
EXTRA UNITS	0	
DBV UNITS	4	
UNITS PER CREDIT	1	
UNITS PER BONUS	0	
MIN UNITS	0	
CREDITS TO START	2	
CREDITS TO CONTINUE	2	
MAX CREDITS	32	
COINS PER BILL	4	
SHOW CREDIT FRACTIONS ON		
LEFT COIN COUNT	1	
RIGHT COIN COUNT	1	
CENTER COIN COUNT	0	
EXTRA COIN COUNT	0	
DBV COIN COUNT	4	
CURRENCY	DOLLAR	

Press TEST to return to previous menu

## TYPICAL VIEW CURRENT PRICING DISPLAY



## DIFFICULTY ADJUSTMENTS



### DIFFICULTY ADJUSTMENTS MENU SCREEN

The **Difficulty Adjustments** set how much skill players must have to complete a race. Use the operator control switches to select **Difficulty Adjustments** and press the TEST button to activate the sub menu. Select each variable using the operator control switches and press TEST to enter change mode. Use the operator control switches to change the variable, then press TEST to save changes and exit the variable.

**Track Difficulty** sets the initial time available for play. Higher values require players to maintain faster average speeds between checkpoints. The range of adjustment is from 1 to 100. Factory default is 40.

**AI Difficulty** sets the competitiveness of drone boats. The number of boats does not change, but their skill at negotiating the track does. The range of adjustment is from 1 to 100. Factory default is 50.

The **Free Race Limiter** enables the **AI** (Artificial Intelligence) to keep pace with player's skill levels. Set this to ON to limit the number of free races based on player ability. Set it to OFF to keep **AI** values at a fixed level regardless of the number of free races won. The range is OFF or ON. Factory default is OFF.

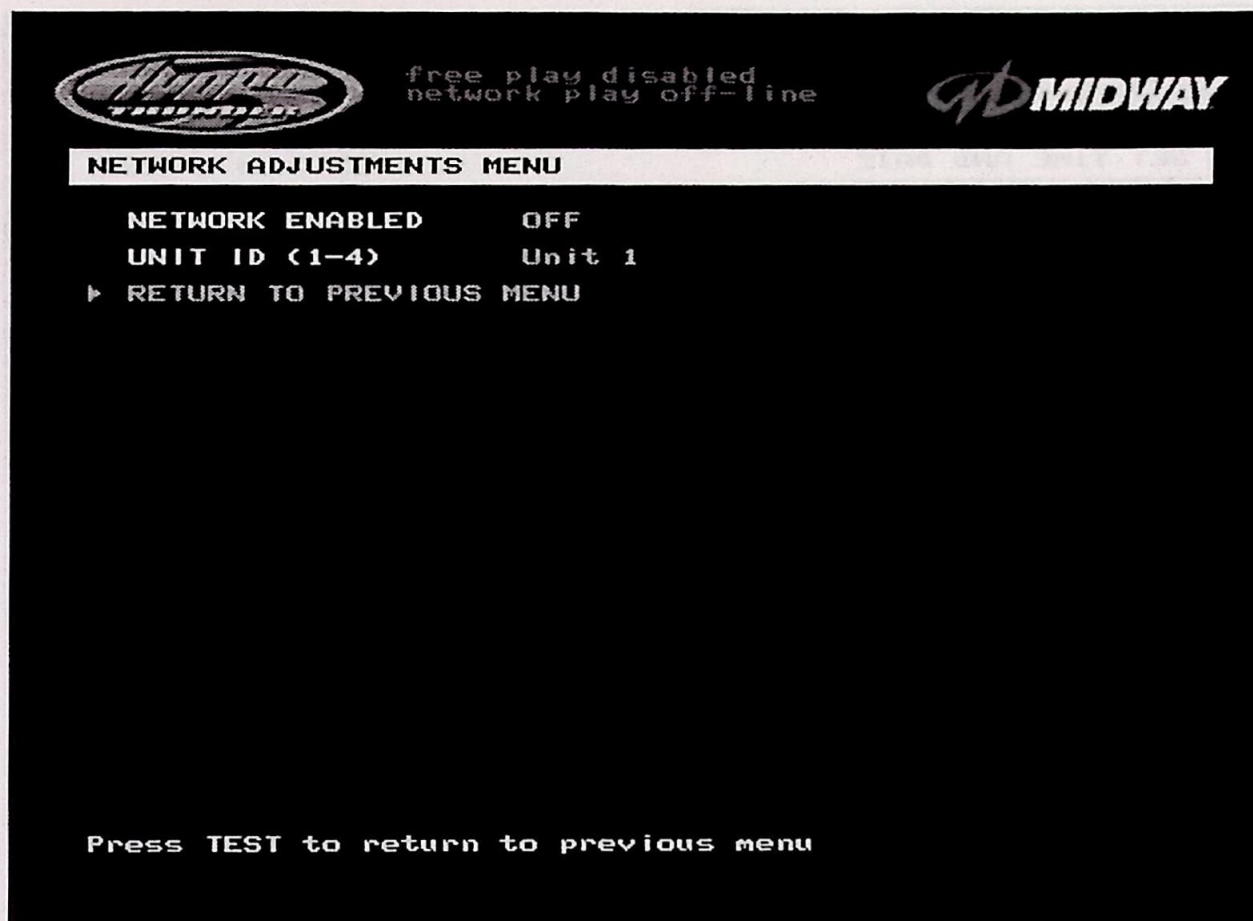
**Limit Free Races To** is the award cut-off point. It prevents expert players from monopolizing a cabinet. It may be fixed or variable (see **Free Race Limiter** above). The range is 1 to 100%. Factory default is 20%.

**Reset Tracks to Defaults** returns the Track Difficulty settings to factory defaults. Choose this item to return this variable to its original value. This screen permits changes all of the existing values at one time.

**Reset AI to Defaults** returns the Track Difficulty settings to factory defaults. Choose this item to return this variable to its original value. This screen permits changes all of the existing values at one time.



## NETWORK ADJUSTMENTS



### NETWORK ADJUSTMENTS MENU SCREEN

The **Network Adjustments Menu** allows an operator to set the game cabinet network identity. Use the operator control switches to select the **Network Adjustments Menu** and press TEST to enter the sub-menu. Use the operator control switches to select one of the items and press TEST to permit change. Select a new value, then press TEST once again to save changes and return to the above screen.

The best way to set these variables is to set all cabinets to this adjustment menu at the same time.

Set **Network Enabled** to ON if the cabinet is linked to other games. This allows the game electronics to communicate with other cabinets. Choose OFF to prohibit linked game play. Factory Default is OFF.

**Unit ID** determines the address of the game. Each linked game must have a unique number to prevent network confusion. Sequence is not important, only that no two are the same. Factory Default is 1.



## SET THE TIME AND DATE



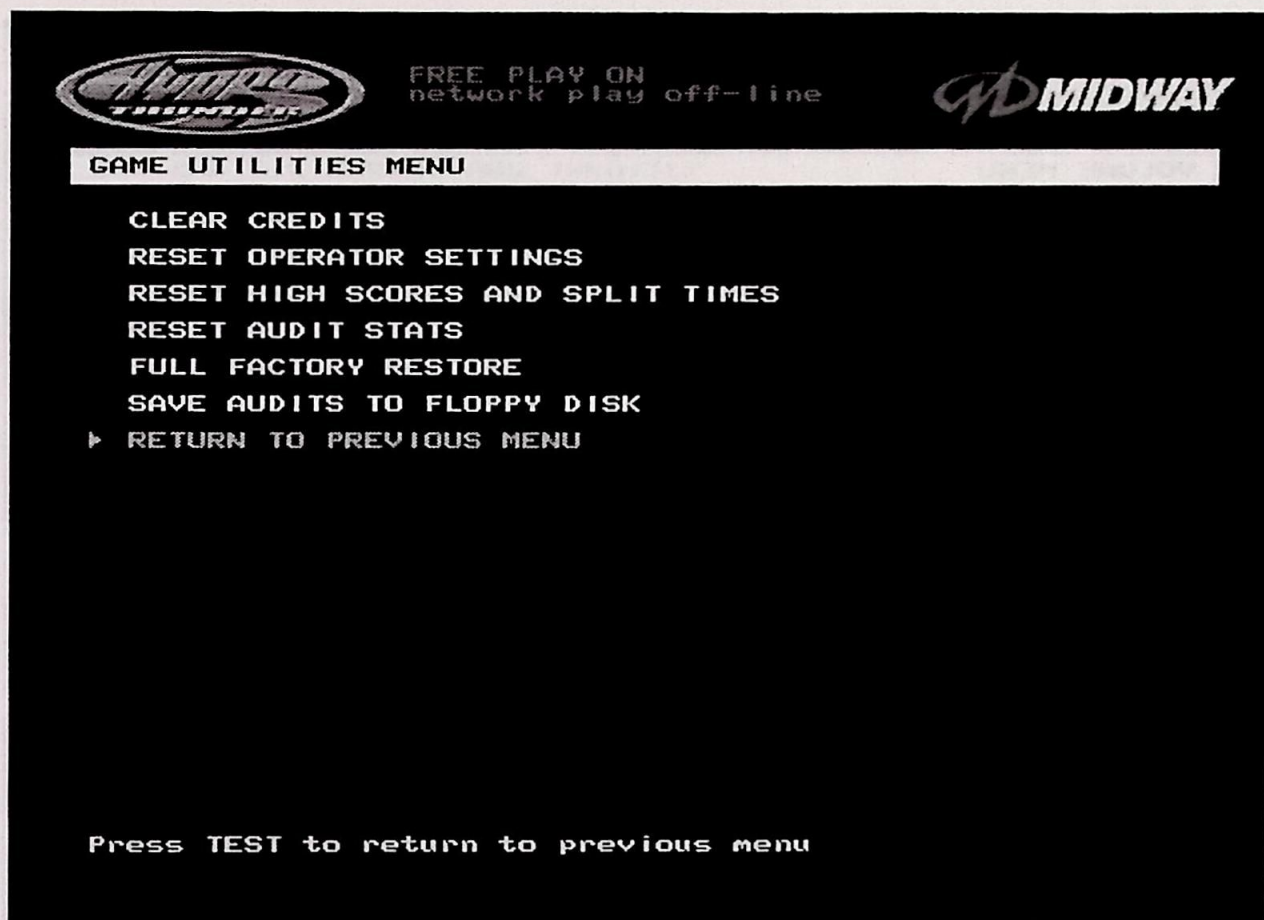
### TIME AND DATE MENU SCREEN

The **Set Time and Date** menu provides the current date and time for the game. This screen also allows operators to adjust the clock for changes in time zones and seasonal changes in time. Use the operator control switches to select **Set Time and Date**, then press TEST to activate the sub-menu. Use the operator control switches to select a variable and press TEST to make changes. Select a new value, then press TEST once again to save changes and return to the above screen.

Once set, the clock runs until the battery dies or the electrical circuits are disrupted by service or a major fault. The clock assists in providing accurate game statistics. It does not affect the game operation.



## GAME UTILITIES MENU



### GAME UTILITIES MENU SCREEN

The **Game Utilities Menu** permits operator changes to credits, player statistics, and game audits. It also allows the operator to restore game settings to factory defaults or save audit information for later use. A confirmation screen appears before changes become final. Use the operator control switches to select the **Game Utilities Menu** and press TEST to activate the sub-menu. Follow the on-screen instructions to select any item and activate it.

**Clear Credits** resets the existing number of game credits to zero.

**Reset Operator Settings** returns the **Adjustments Menus** variables to the original factory defaults.

**Reset High Scores and Split Times** resets the player high score table to factory default ghost data.

**Reset Audit Stats** resets the track and boat audit values to zero.

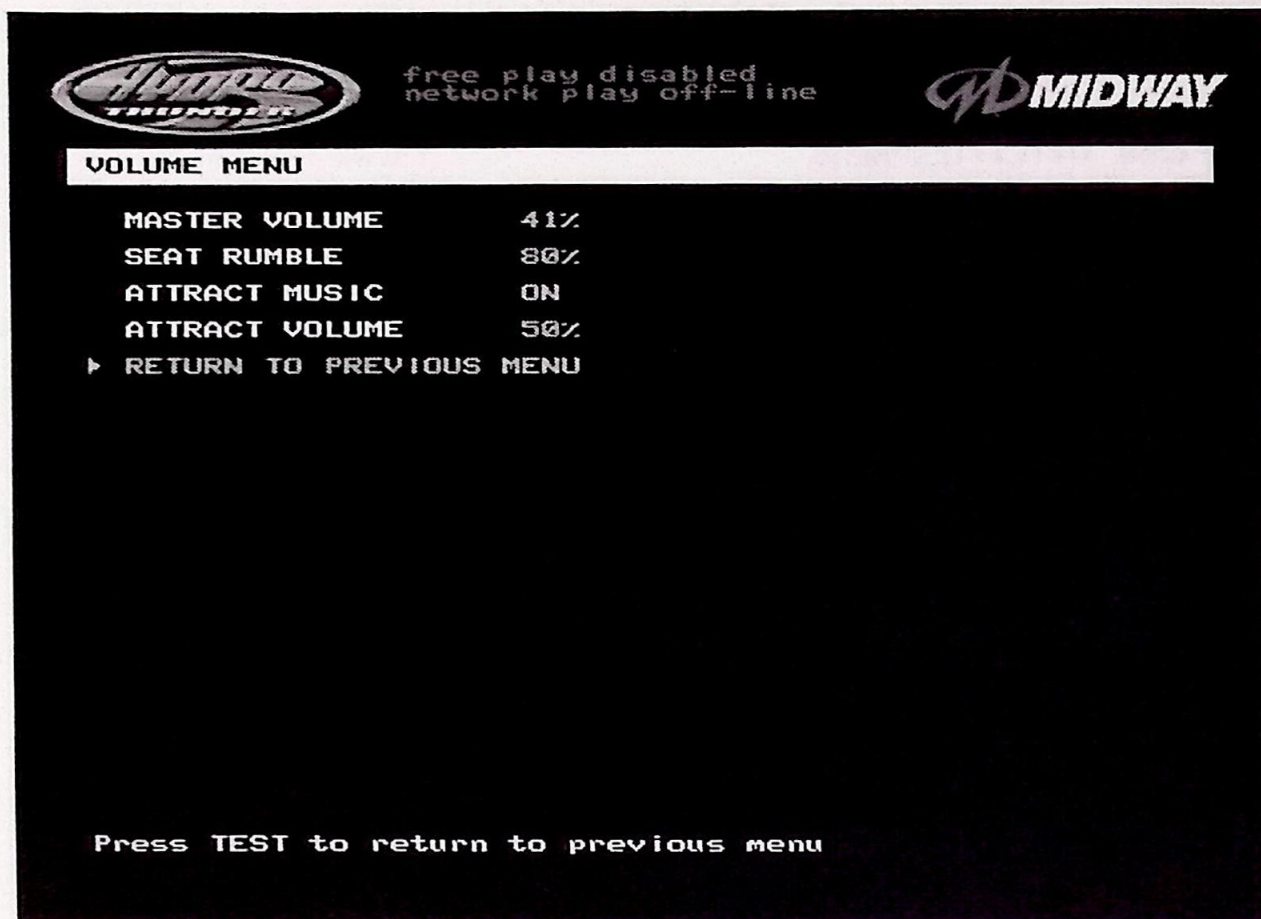
**Full Factory Restore** resets all of the game variables above to factory default values at one time.

**Save Audits to Floppy Disk** allows the operator to save game data to a formatted 1.44MB high-density diskette before clearing values. The floppy disk drive is in the CPU cabinet. Comparison of audit data over time can provide the operator with useful information about the effect of game variables on profits.

*Note: Once data has been cleared, it cannot be restored. Use the "Save Audits to Floppy Disk" option on this menu to save the data for analysis. Use caution when clearing audit information. To clear these registers, use the **Reset** or **Full Factory Restore** functions of this menu.*



## VOLUME MENU



### VOLUME ADJUSTMENT MENU SCREEN

The **Volume Menu** allows the operator to adjust the relative loudness levels. Use the operator control switches to select **Volume Menu**, then press TEST to activate the sub-menu. Select an option with the operator control switches and press TEST to activate it. Follow the on-screen instructions to save the changes and continue to other menu screens.

*Note: Use these adjustments to raise the audio levels during the sound tests. They may be returned to their optimum loudness after testing is completed.*

**Master Volume** sets the relative volume level during game play. This value affects all of the other settings at the same time. The range is 1 to 100%. Factory default is 41%.

*Note: The following individual volume adjustments are all affected by the Master Volume setting. However, this does allow the Attract and Seat Rumble sounds to be made higher or lower than the normal level of game sounds coming from the two upper cabinet speakers. For example, if the Attract volume is set to 50%, the Attract sounds will be half as loud as the normal game volume.*


**Seat Rumble** adjusts the output level of the speaker in the seat assembly. The audio from this speaker vibrates the seat to add realism. The range is 1 to 100%. Factory default is 80%.

**Attract Music** selects sound or silence during the attract mode. This adjustment does not change any of the volume settings. Factory default is ON.


**Attract Volume** adjusts the sounds of the Attract mode only when **Attract Music** is set to ON. These sounds are independent of the game audio levels. The range is 1 to 100%. Factory default is 50%.



# CALIBRATE STEERING AND THROTTLE



FREE PLAY ON  
network play off-line



CALIBRATE STEERING AND THROTTLE


CENTER THE WHEEL  
SET THROTTLE TO NEUTRAL  
THEN PRESS TEST OR BOOST

WHEEL 0.50
 
 RAW RANGE 128 10 128 200


THROTTLE 0.50
 
 RAW RANGE 128 10 128 200

Press CREDIT to cancel

## STEERING AND THROTTLE CALIBRATION INSTRUCTION SCREEN



FREE PLAY ON  
network play off-line



CALIBRATE STEERING AND THROTTLE

MOVE THE WHEEL THROUGH ITS FULL RANGE  
MOVE THE THROTTLE THROUGH ITS FULL RANGE  
THEN PRESS TEST OR BOOST TO ACCEPT

WHEEL 0.50
 
 RAW RANGE 128 10 128 200

THROTTLE 0.50
 
 RAW RANGE 128 10 128 200

Press TEST to accept; CREDIT to cancel

## STEERING AND THROTTLE CALIBRATION ACTION SCREEN



**Calibrate Steering and Throttle** allows the operator to set the steering and throttle mechanisms for optimum control during game play. Poorly calibrated player controls can reduce profits. Calibrate the player control switches after making repairs to the game or moving it to a new location. Use the player control switches to select **Calibrate Steering and Throttle** and press the TEST button to activate the test.

Each of the controls has a minimum analog value of 0 and a maximum of 1.0 for its full range of motion. These numbers correspond to digital values from 0 to 255. Both sets of numbers must track correctly to achieve accurate steering of boats. When properly adjusted, the digital value will be equal to the analog value multiplied by 255. For example, a steering value of 0.5 (straight ahead) translates to a digital value of 128, exactly half way in between left and right steering wheel limits.



NAME	START	CONTINUE	CREDITS/COIN	COIN 1	COIN 2	COIN 3	COIN4	BILL
USA1	2	2	1/25¢	.25¢	.25¢			\$1.00
USA2	2	1	1/25¢	.25¢	.25¢			\$1.00
USA3	1	1	1/25¢	.25¢	.25¢			\$1.00
USA4	1	1	1/50¢, 3/\$1.00	.25¢	.25¢			\$1.00
USA5	2	1	1/50¢, 4/\$1.00	.25¢	.25¢			\$1.00
USA6	1	1	1/50¢	.25¢	.25¢			\$1.00
USA7	1	1	1/50¢, 3/\$1.00	.25¢	.25¢			\$1.00
USA8	2	2	1/50¢, 4/\$1.00	.25¢	.25¢			\$1.00
USA9	3	2	1/25¢, 4/\$1.00	.25¢	.25¢			\$1.00
USA10	3	3	1/25¢, 4/\$1.00	.25¢	.25¢			\$1.00
USA 11	4	2	1/\$1.00, 2/\$1.50	.25¢	.25¢			\$1.00
USA 12	4	3	1/\$1.00, 2/\$1.75	.25¢	.25¢			\$1.00
USA 13	4	4	1/\$1.00	.25¢	.25¢			\$1.00
USA ECA	3	3	1/25¢, 4/\$1.00	\$1.00	.25¢	.10¢	.05¢	\$1.00
GERMANY1	2	2	1/1DM, 6/5DM	1DM	5DM			
GERMANY2	2	1	1/1DM, 7/5DM	1DM	5DM			
GERMANY3	2	1	1/1DM, 8/5DM	1DM	5DM			
GERMANY4	2	1	1/1DM, 5/5DM	1DM	5DM			
GERMANY5	2	1	1/1DM, 6/5DM	1DM	5DM			
GERMANY ECA	2	2	1/1DM, 2/2DM, 6/5DM	5DM	2DM	1DM		
FRANCE1	2	2	2/5Fr, 5/10Fr	5Fr	10Fr			
FRANCE2	2	1	2/5Fr, 4/10Fr	5Fr	10Fr			
FRANCE3	2	1	1/5Fr, 3/10Fr	5Fr	10Fr			
FRANCE4	2	1	1/5Fr, 2/10Fr	5Fr	10Fr			
FRANCE5	2	1	2/5Fr, 5/10Fr, 11/2 X 10Fr	5Fr	10Fr			
FRANCE6	2	1	2/5Fr, 4/10Fr, 9/2 X 10Fr	5Fr	10Fr			
FRANCE7	2	1	1/5Fr, 3/10Fr, 7/2 X 10Fr	5Fr	10Fr			
FRANCE8	2	1	1/5Fr, 2/10Fr, 5/2 X 10Fr	5Fr	10Fr			
FRANCE9	2	1	1/3 X 1Fr, 2/5Fr	1Fr	5Fr			
FRANCE10	2	1	1/2 X 1Fr, 3/5Fr	1Fr	5Fr			
FRANCE11	2	1	1/3 X 1Fr, 2/5Fr, 5/2 X 5Fr	1Fr	5Fr			
FRANCE12	2	1	1/2 X 1Fr, 3/5Fr, 7/2 X 5Fr	1Fr	5Fr			
FRANCE ECA	1	1	1/10 Fr, 4/30 Fr	1Fr	5Fr			
FRANCE ECA 1	1	1	2/5Fr, 5/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 2	1	1	2/5Fr, 4/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 3	1	1	1/5Fr, 3/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 4	1	1	1/5Fr, 2/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 5	1	1	2/5Fr, 5/10Fr, 11/2 X 10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 6	1	1	2/5Fr, 4/10Fr, 9/2 X 10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 7	1	1	1/5Fr, 3/10Fr, 7/2 X 10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 8	1	1	1/5Fr, 2/10Fr, 5/2 X 10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 9	1	1	1/3 X 1Fr, 2/5Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 10	1	1	1/2 X 1Fr, 3/5Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 11	1	1	1/3 X 1Fr, 2/5Fr, 5/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 12	1	1	1/2 X 1Fr, 3/5Fr, 7/10Fr	1Fr	5Fr	10Fr	20Fr	
FRANCE ECA 13	1	1	1/10Fr, 2/20Fr, 4/30Fr	1Fr	5Fr	10Fr	20Fr	
CANADA	2	2	1/\$1.00, 2/\$2.00	\$1.00	\$2.00			\$1.00
SWITZERLAND 1	2	2	1/1SFr, 6/5SFr	1SFr	5SFr			
SWITZERLAND 2	2	2	1/1SFr, 7/5SFr	1SFr	5SFr			
SWITZERLAND 3	2	2	1/1SFr, 8/5SFr	1SFr	5SFr			
ITALY	2	2	1/500Lit	500Lit	500Lit			
UK ECA1	1	1	1/50p, 3/£1.00	£1.00	50p	20p	10p	
UK ECA2	1	1	1/50p, 2/£1.00	£1.00	50p	20p	10p	
UK ECA3	1	1	1/30p, 2/50p, 5/£1.00	£1.00	50p	20p	10p	
UK4	1	1	1/50p, 3/£1.00	£1.00	50p			
UK5	1	1	1/50p, 2/£1.00	£1.00	50p		10p	
UK6 ECA	1	1	2/50p	£1.00	50p	20p	10p	
UK7 ECA	1	1	3/£1.00	£1.00	50p	20p	10p	
SPAIN1	2	2	1/100Pta, 6/500Pta	100Pta	500Pta			
SPAIN2	2	2	1/100Pta, 5/500Pta	100Pta	500Pta			
AUSTRALIA1	2	2	1/3X20¢, 2/\$1.00	.20¢	\$1.00			
AUSTRALIA2	2	2	1/5X20¢, 1/\$1.00	.20¢	\$1.00			
JAPAN1	2	2	1/100Yen	100 Yen	100 Yen			
JAPAN2	2	2	2/100Yen	100 Yen	100 Yen			
AUSTRIA1	2	2	1/5Sch, 2/10Sch	5 Sch	10 Sch			
AUSTRIA2	2	2	1/2X5Sch, 3/2X10Sch	5 Sch	10 Sch			
BELGIUM1	2	2	1/20BF	20BF	20BF			
BELGIUM2	2	2	3/20BF	20BF	20BF			
BELGIUM3	2	2	2/20BF	20BF	20BF			
BELGIUM ECA	2	2	1/20BF	50BF	20BF	5BF		
SWEDEN	2	2	1/3X1SKr, 2/5SKr	1SKr	5SKr			
NEW ZEALAND1	1	1	1/3X20¢	20¢	20¢			
NEW ZEALAND2	1	1	1/2X20¢	20¢	20¢			
NETHERLANDS	2	2	1/1HFI, 3/2.5HFI	1HFI	2.5HFI			
FINLAND	2	2	1/1Fmk	1Fmk	1Fmk			
NORWAY	2	2	1/2X1NKR, 3/5X1NKR	1NKR	1NKR			
DENMARK	2	2	1/2X1DKr, 3/5DKr, 7/2X5DKr	1DKr	5DKr			
ANTILLIES	2	2	1/25¢, 4/1G	.25¢	1G			
HUNGARY	2	2	1/2X10Ft, 3/2X20Ft	10Ft	20Ft			







# HYDROTHUNDER<sup>TM</sup>

## CHAPTER THREE

## SERVICE

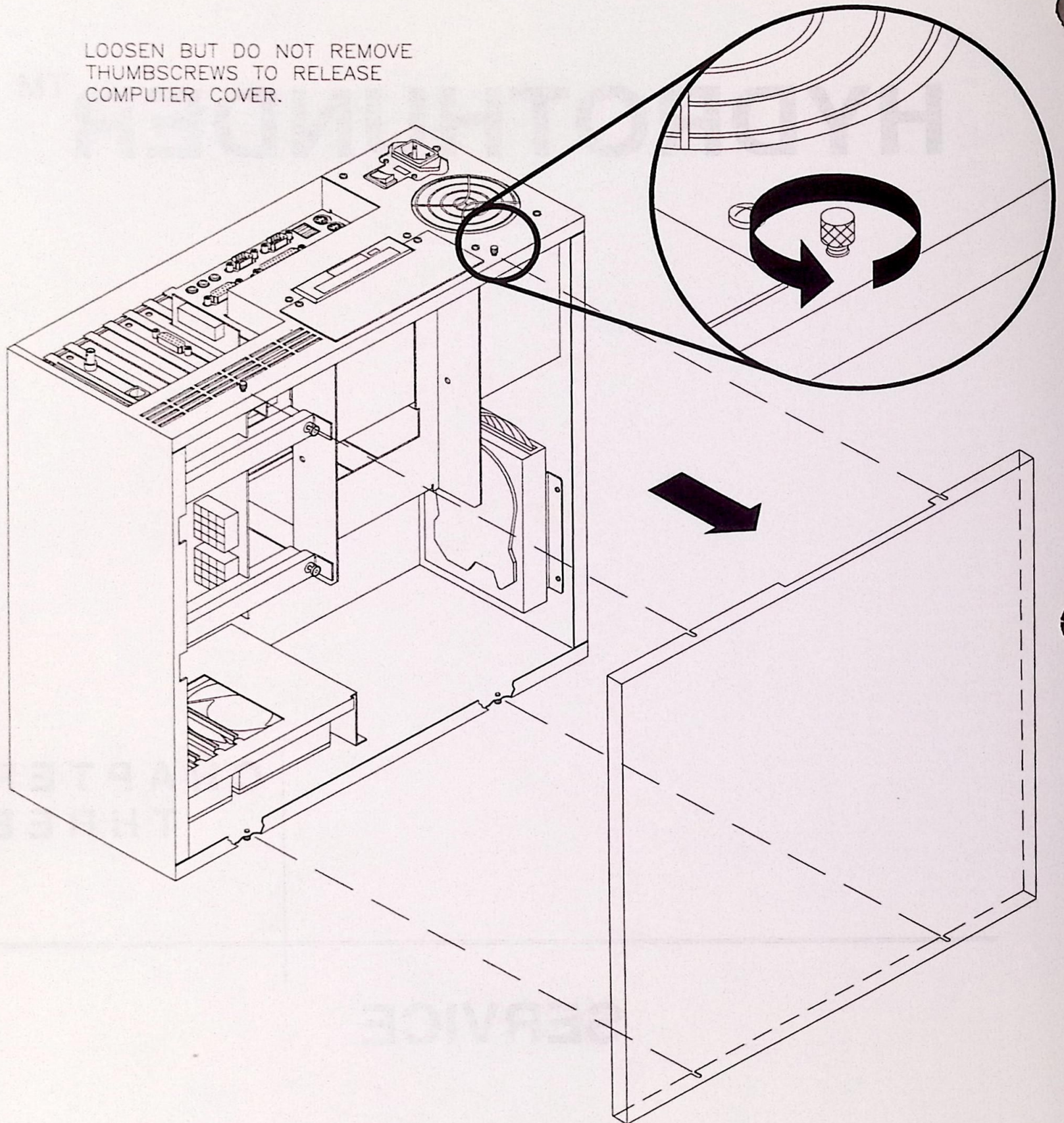


**NOTICE:** This manual is subject to change without notice. MIDWAY reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods warrant.



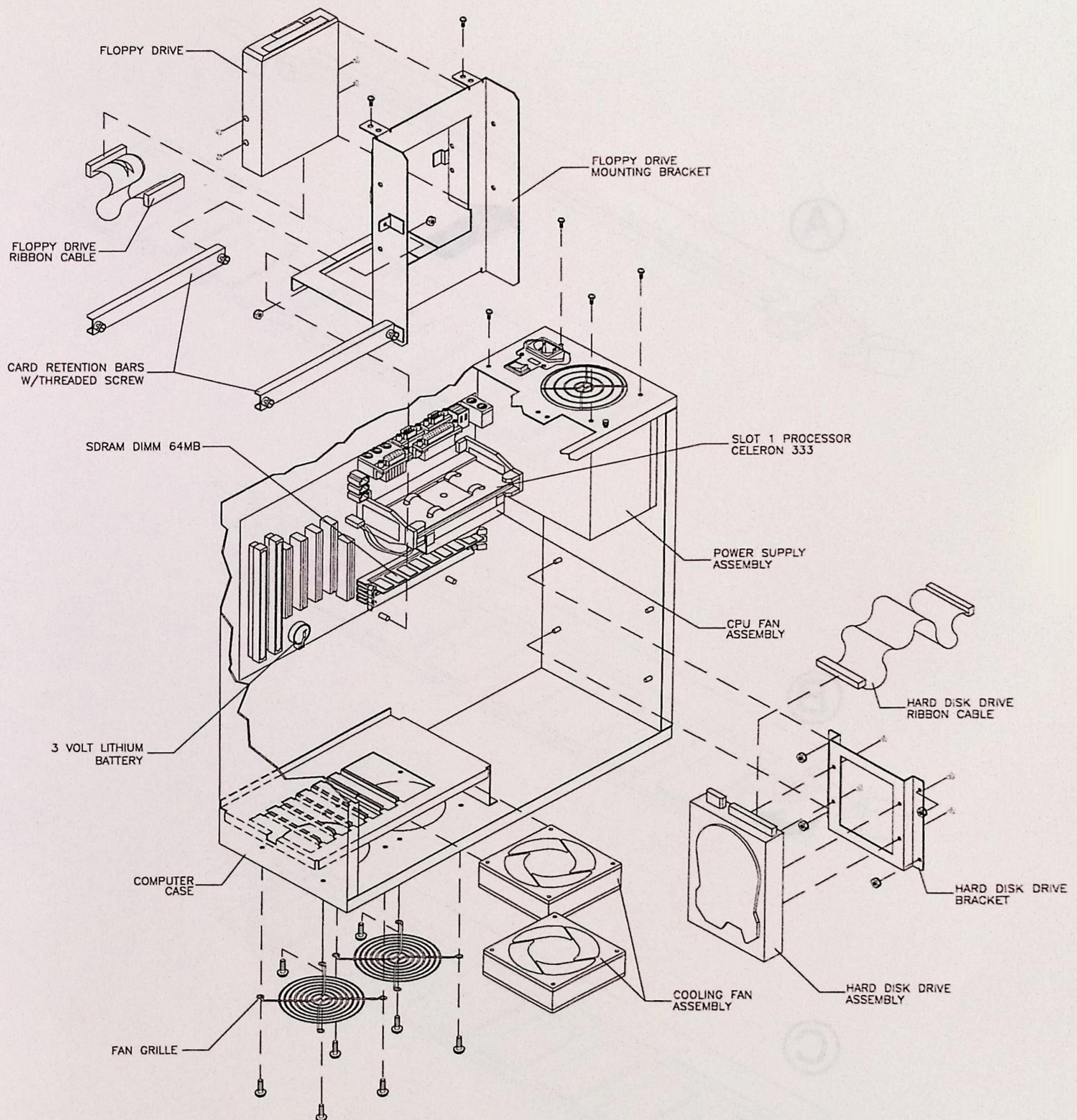
## REMOVING THE COMPUTER COVER

LOOSEN BUT DO NOT REMOVE  
THUMBSCREWS TO RELEASE  
COMPUTER COVER.



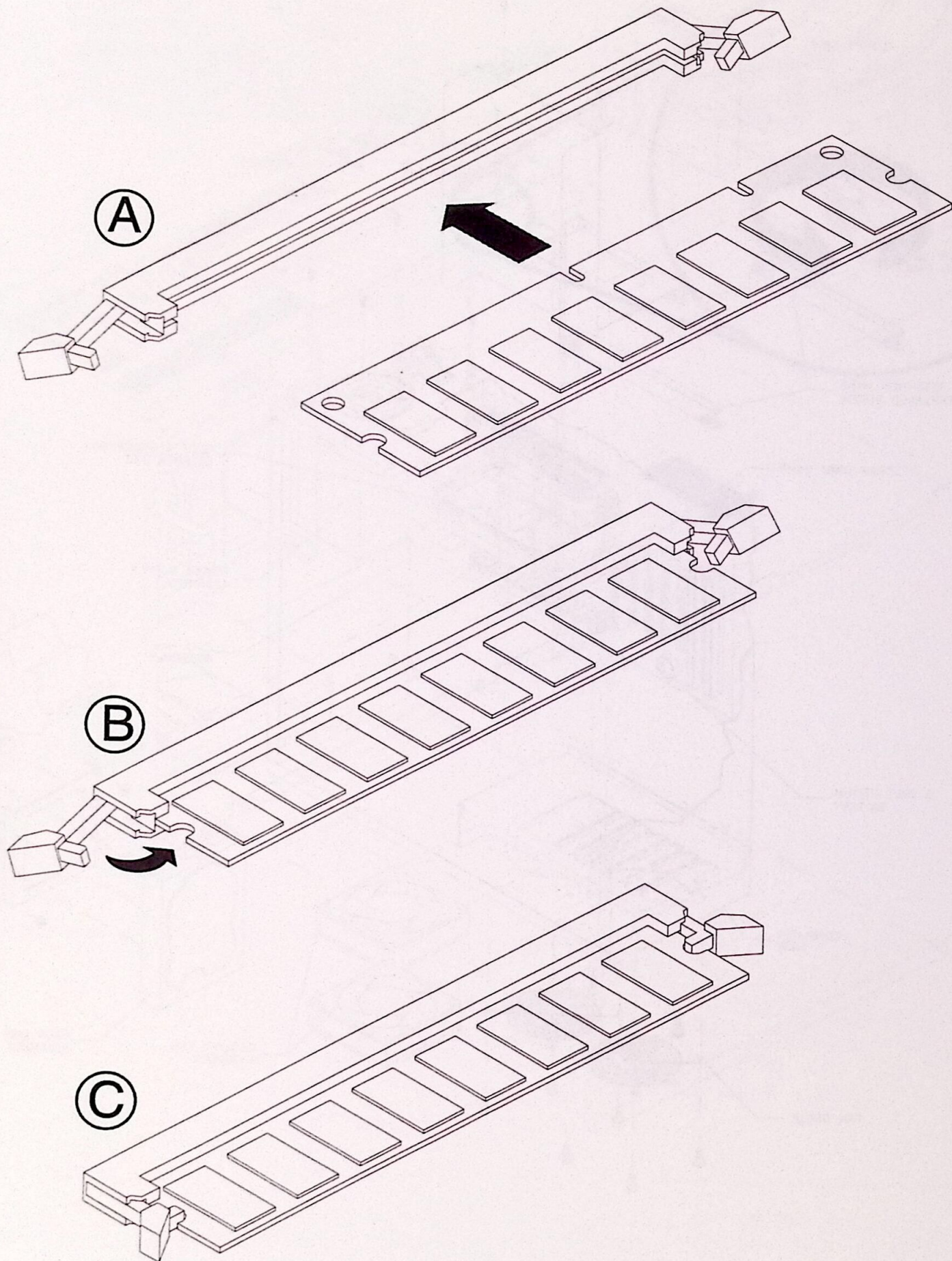


## ARCADE COMPUTER ASSEMBLY





# INSTALLING DUAL INLINE MEMORY MODULE IN MOTHERBOARD SOCKET





FURTHER INFORMATION IS UNDER DEVELOPMENT.

# HYDROTHUNDER™

## CHAPTER FOUR

## PARTS

Warning:  
Use of non-approved parts may void the warranty and cause damage to the unit.  
Damage: Use only approved parts and follow the instructions.  
To: [illegible]  
Sub: [illegible]



NOTES



# HYDROTHUNDER™

## CHAPTER FOUR

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## PARTS

### Warning

USE OF NON-MIDWAY PARTS OR CIRCUIT MODIFICATIONS MAY CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE! USE ONLY MIDWAY AUTHORIZED PARTS.

- \* For safety and reliability, substitute parts and modifications are not recommended.
- \* Substitute parts or modifications may void EMC directives or FCC type acceptance.



## CABINET FRONT VIEW

### FLUORESCENT LAMP ASSEMBLIES:

<b>A-22365</b>	120VAC 60HZ 15W
<b>A-22365-1</b>	220VAC 50HZ 15W
<b>A-22365-2</b>	240VAC 60HZ 15W
<b>A-22365-3</b>	100VAC 50HZ 15W
<b>A-22365-4</b>	230VAC 50HZ 15W
<b>A-22365-5</b>	240VAC 50HZ 15W

**5555-15098-00**  
SPEAKER 5-1/2" 8 OHM, SHIELDED

**5675-15639-01**  
MONITOR 25KHZ MEDIUM RES

**08-7853**  
CRT GLASS

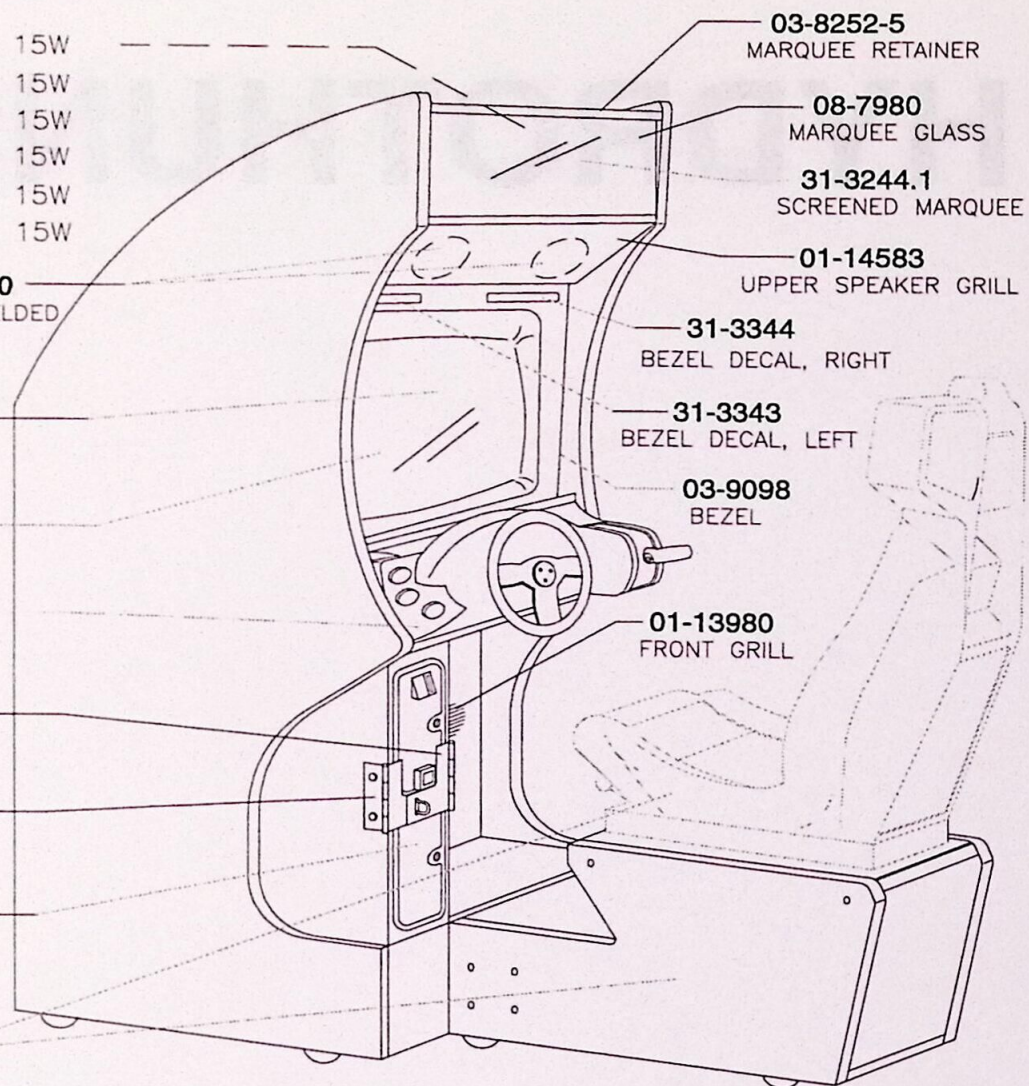
DASH ASSEMBLY  
(SEE DETAIL DRAWING)

**A-20026-1**  
SECURITY BRACKET, RIGHT

**A-20026-2**  
SECURITY BRACKET, LEFT

COIN DOOR ASSEMBLY  
(SEE APPLICATION CHART)

SEAT/PEDESTAL  
ASSEMBLY (SEE  
DETAIL DRAWING)



### HARDWARE NOT SHOWN:

<b>4008-01113-06</b>	MS 8-32x3/8 P-HWH
<b>4008-01003-16</b>	MS 8-32x1 P-PH-S
<b>4020-01100-16</b>	TR TX 1/4-20X1 BH
<b>4020-01100-20</b>	TR 1/4-20X1-1/4 BH CS
<b>4106-01115-12</b>	SMS #6x3/4 P-HWH
<b>4108-01115-20B</b>	SMS #8x1-1/4 PL-HWH-A
<b>4108-01193-10B</b>	SMS #8x5/8 TRX TR
<b>4308-01123-20B</b>	BOLT 8-32x1-1/4 CB
<b>4320-00124-16</b>	BOLT 1/4-20x1 HH
<b>4320-01124-20</b>	BOLT 1/4-20x1-1/4
<b>4320-01164-20B</b>	BOLT 1/4-20x1-1/4 UNC FH
<b>4406-01128-00</b>	NUT 6-32 KEPS
<b>4408-01128-00</b>	NUT 8-32 KEPS
<b>4420-01141-00</b>	NUT 1/4-20 FLANGRIP
<b>4608-01081-11</b>	H-F #8x11/16 P-HWH
<b>4700-00033-00</b>	FW .265x.750x.067
<b>4700-00033-00B</b>	FW 7/64 x.3/4 x15ga. BLACK

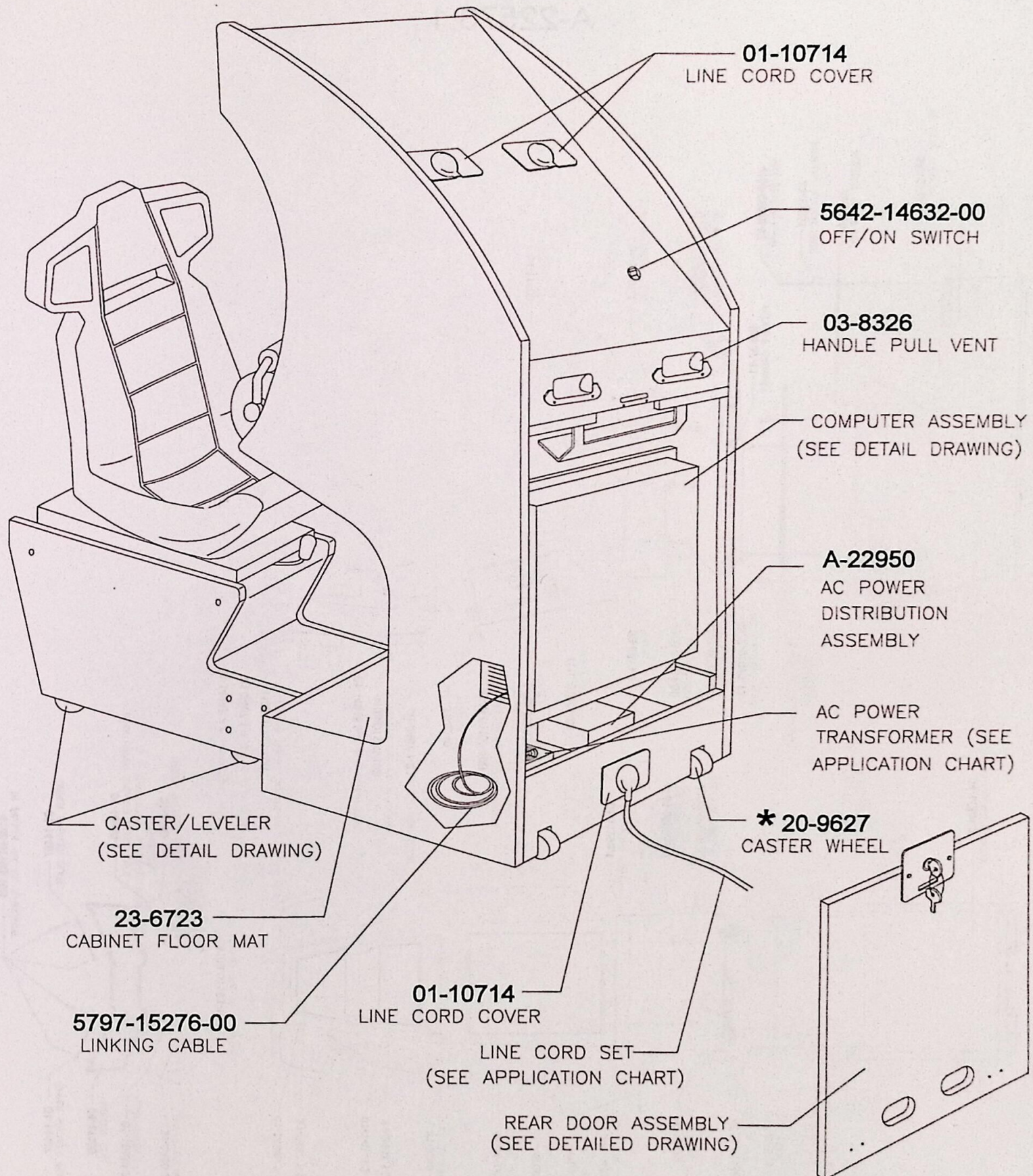
<b>4701-00005-00</b>	LW 1/4 SPLIT
<b>4702-00014-00B</b>	LW 1/4-20 INT TOOTH BLACK
<b>4008-01168-24</b>	MS 8-32x1-1/2 PL-HH-S
<b>4700-00015-00</b>	FW .172x.875x.059

### FLUORESCENT LAMP ASSEMBLY COMPONENTS:

<b>24-8809</b>	F15T8 CW FLUORESCENT BULB
<b>24-8874</b>	ALTERNATE FLUORESCENT BULB
<b>20-10480</b>	15W FLUORESCENT STARTER
<b>20-8749-8</b>	120VAC 60HZ 15W BALLAST
<b>20-10236</b>	240VAC 60HZ 15W BALLAST
<b>20-10263</b>	100VAC 50HZ 15W BALLAST
<b>20-10220</b>	220VAC 50HZ 15W BALLAST
<b>20-10379</b>	230VAC 50HZ 15W BALLAST
<b>20-10380</b>	240VAC 50HZ 15W BALLAST



## CABINET REAR VIEW



\* ASSOCIATED PARTS NOT SHOWN:

02-4404 CASTER SHAFT  
20-8712-37 "E" RING, 3/8 SHAFT



**A-22573.1**





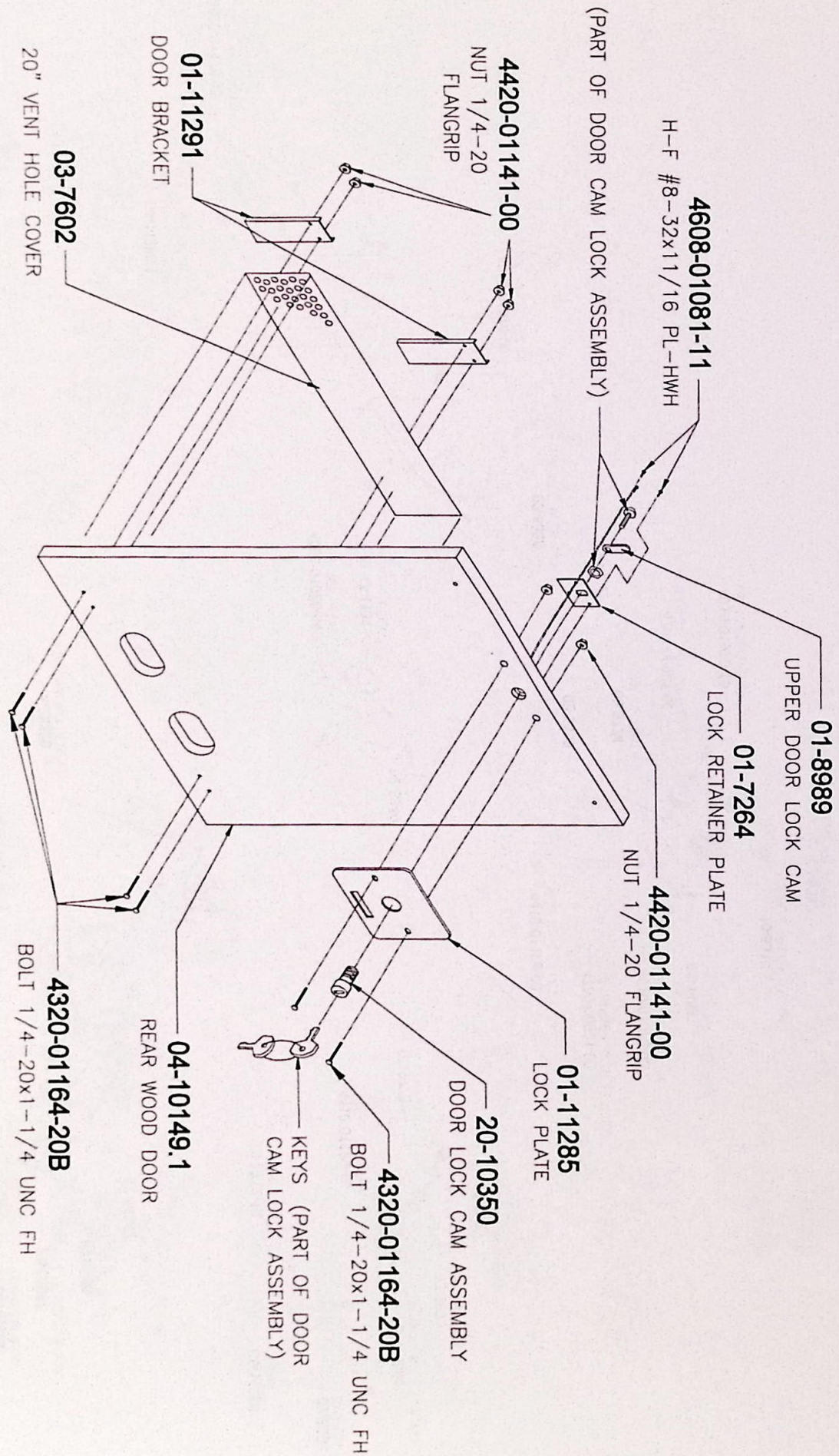
4020-01178-08 —  
MS 1/4-20x1/2 HH FLANGRI





# REAR DOOR ASSEMBLY

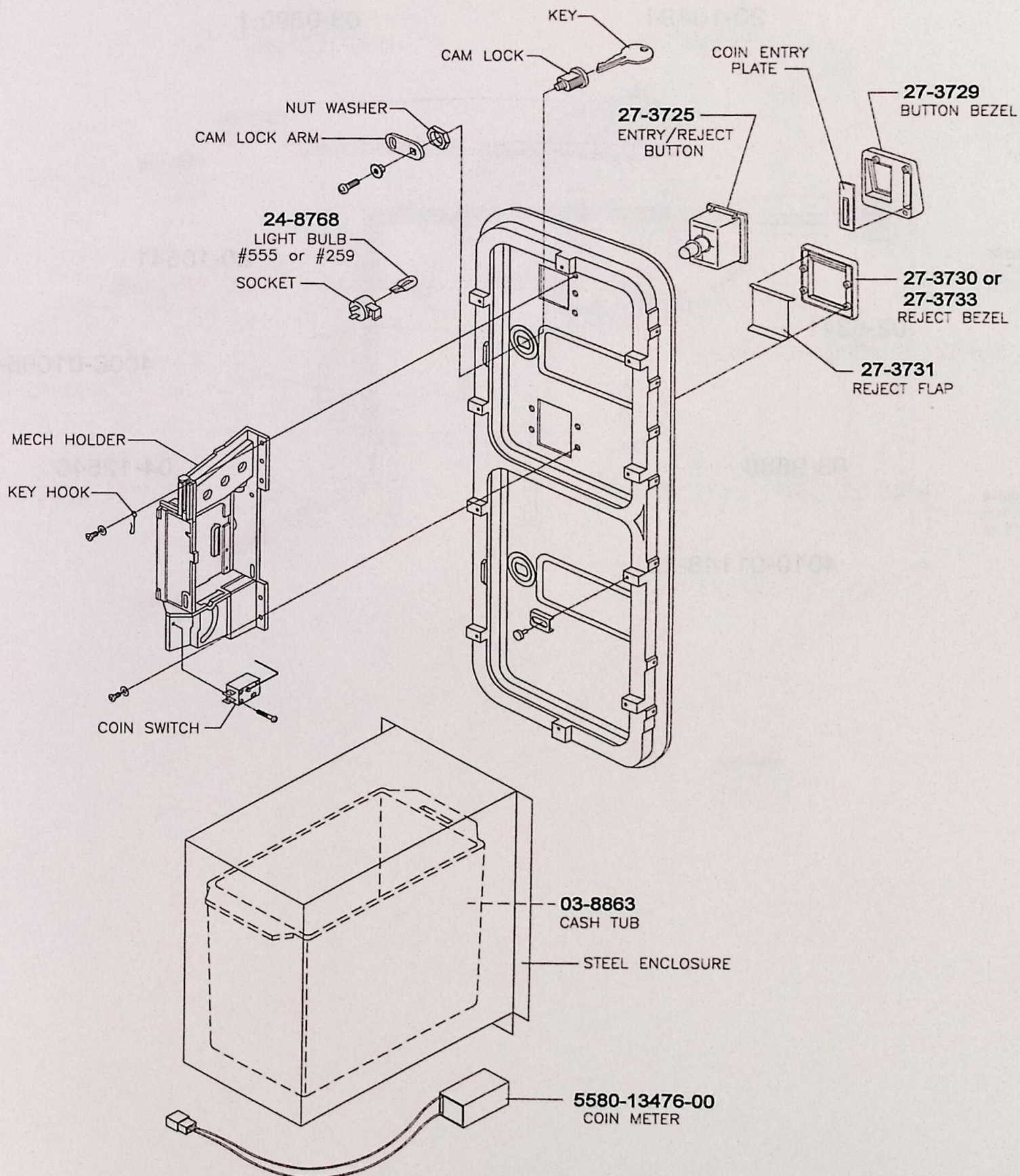
A-21071





## COIN DOOR ASSEMBLY

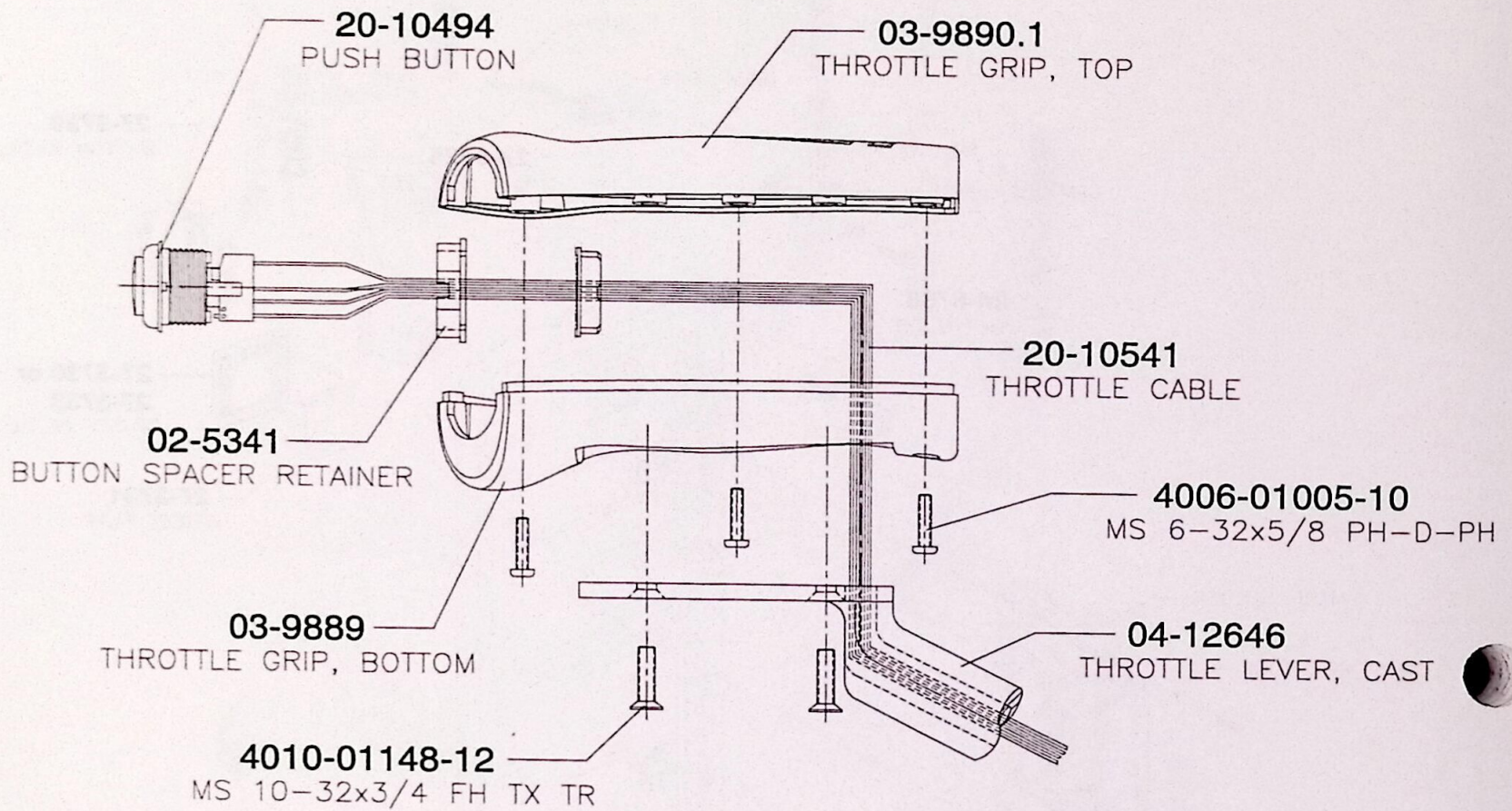
NOTE: SEE COIN DOOR  
APPLICATION CHART FOR  
ASSEMBLY NUMBER





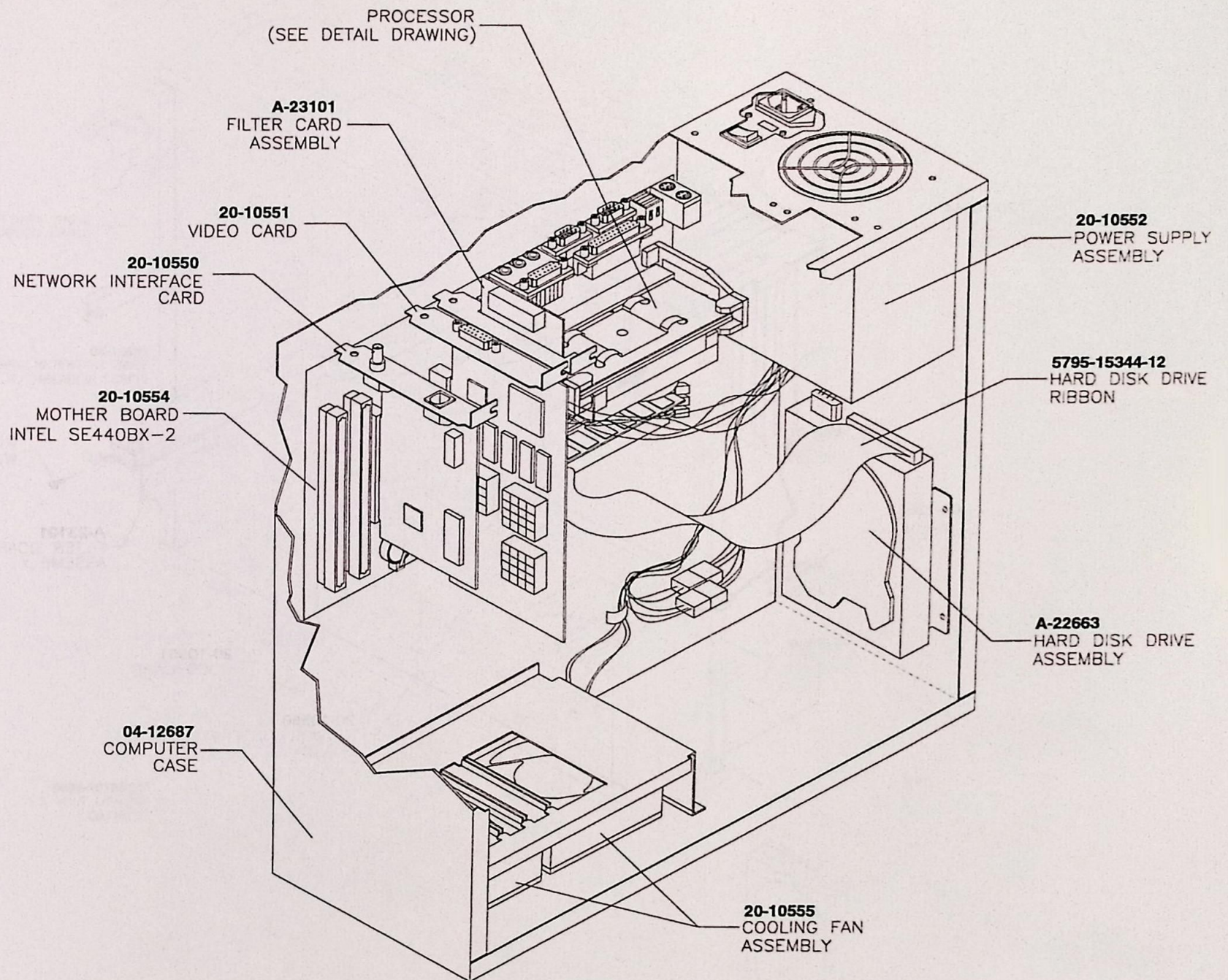
# THROTTLE LEVER ASSEMBLY

## A-23100



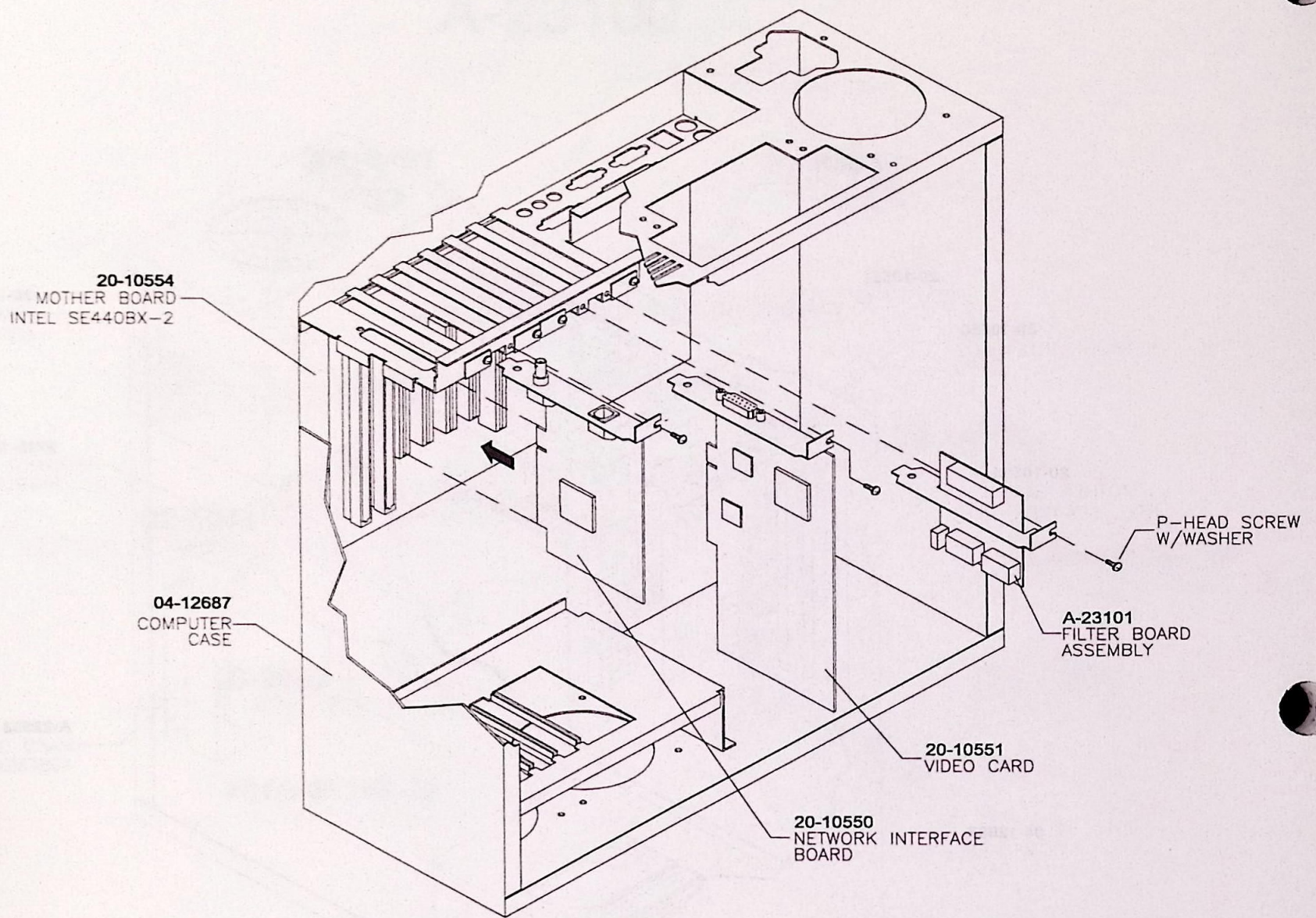


# ARCADE COMPUTER ASSEMBLY



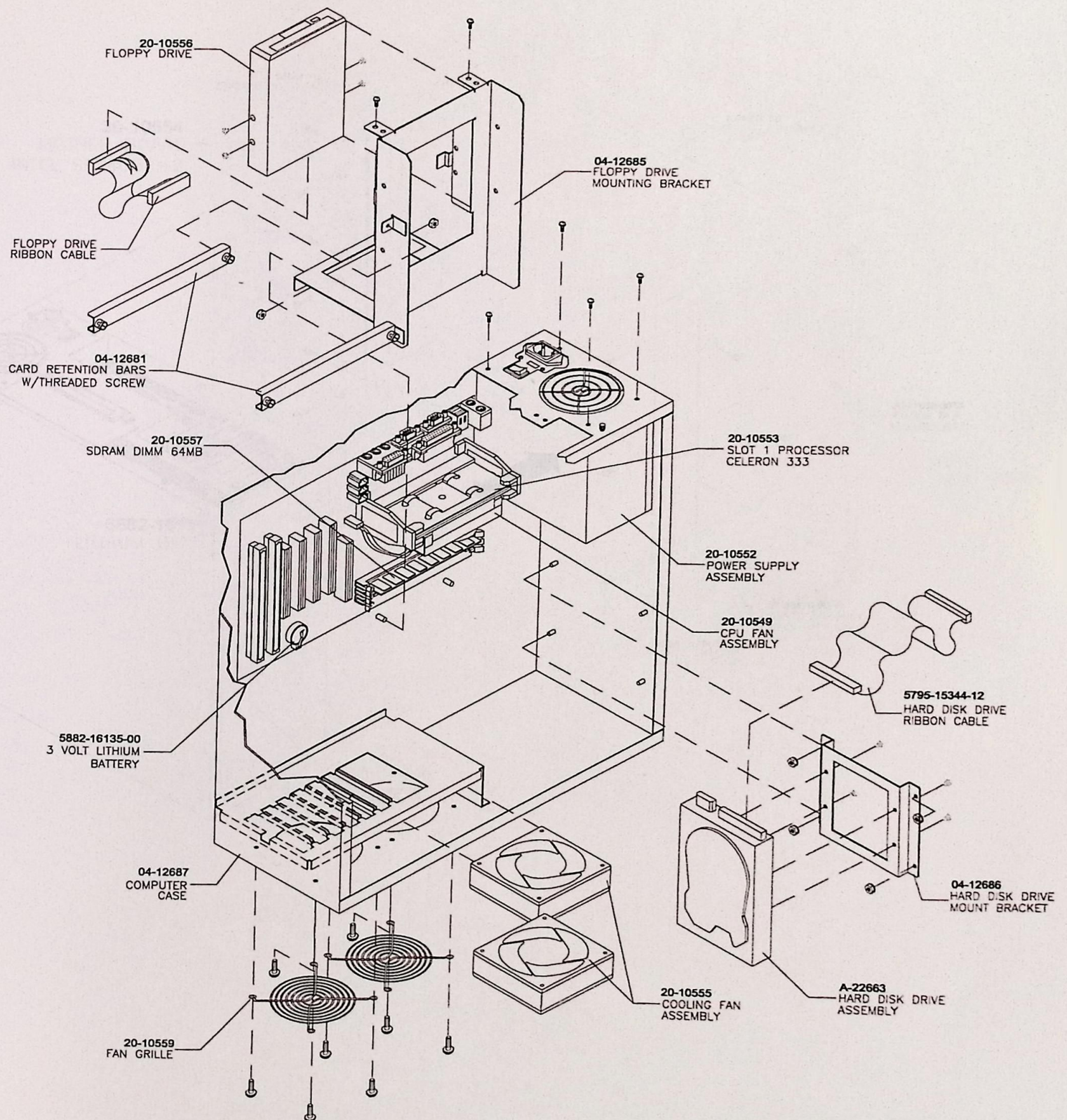


## ARCADE COMPUTER PERIPHERAL CARDS



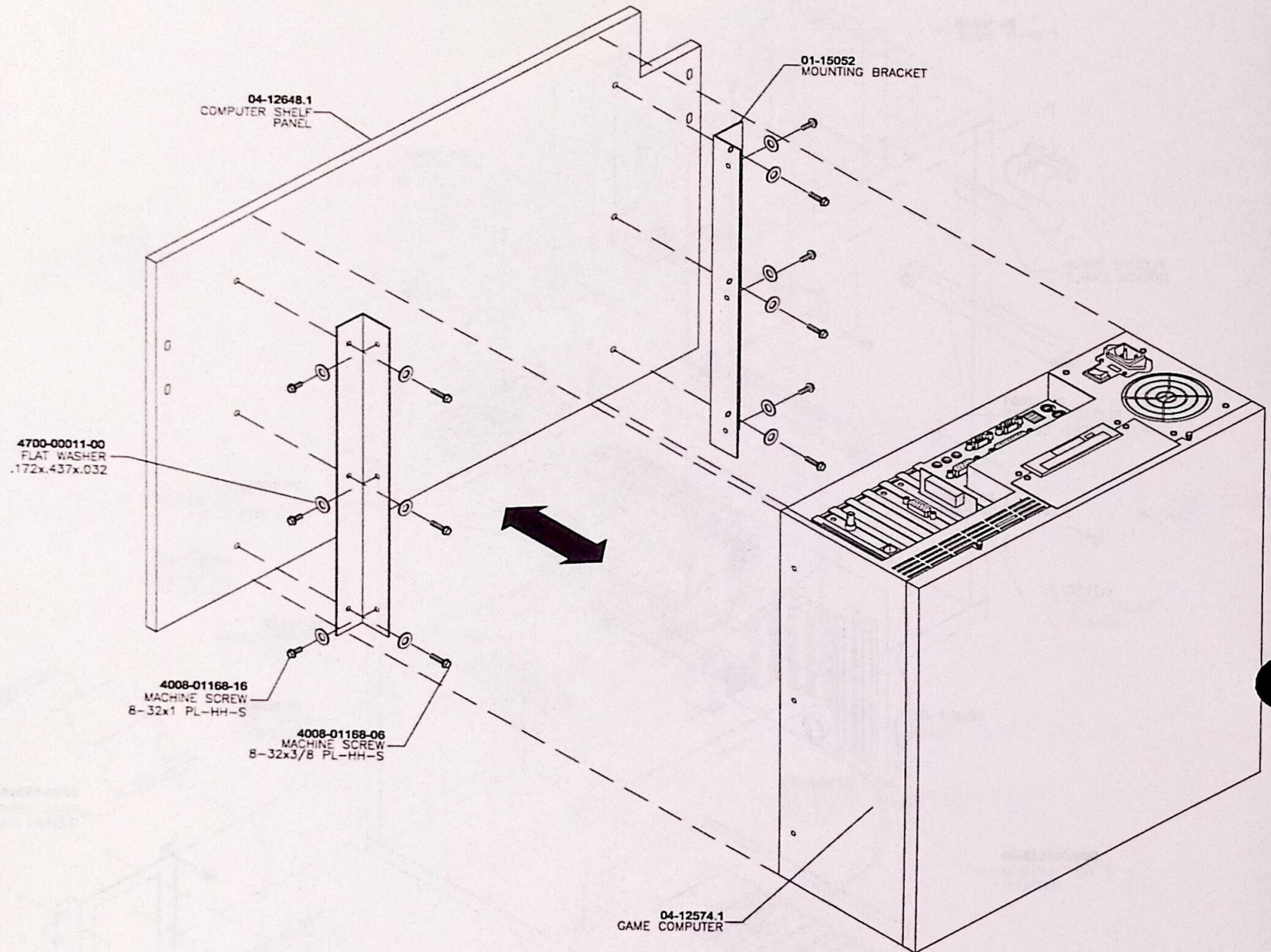


# MECHANICAL COMPONENTS



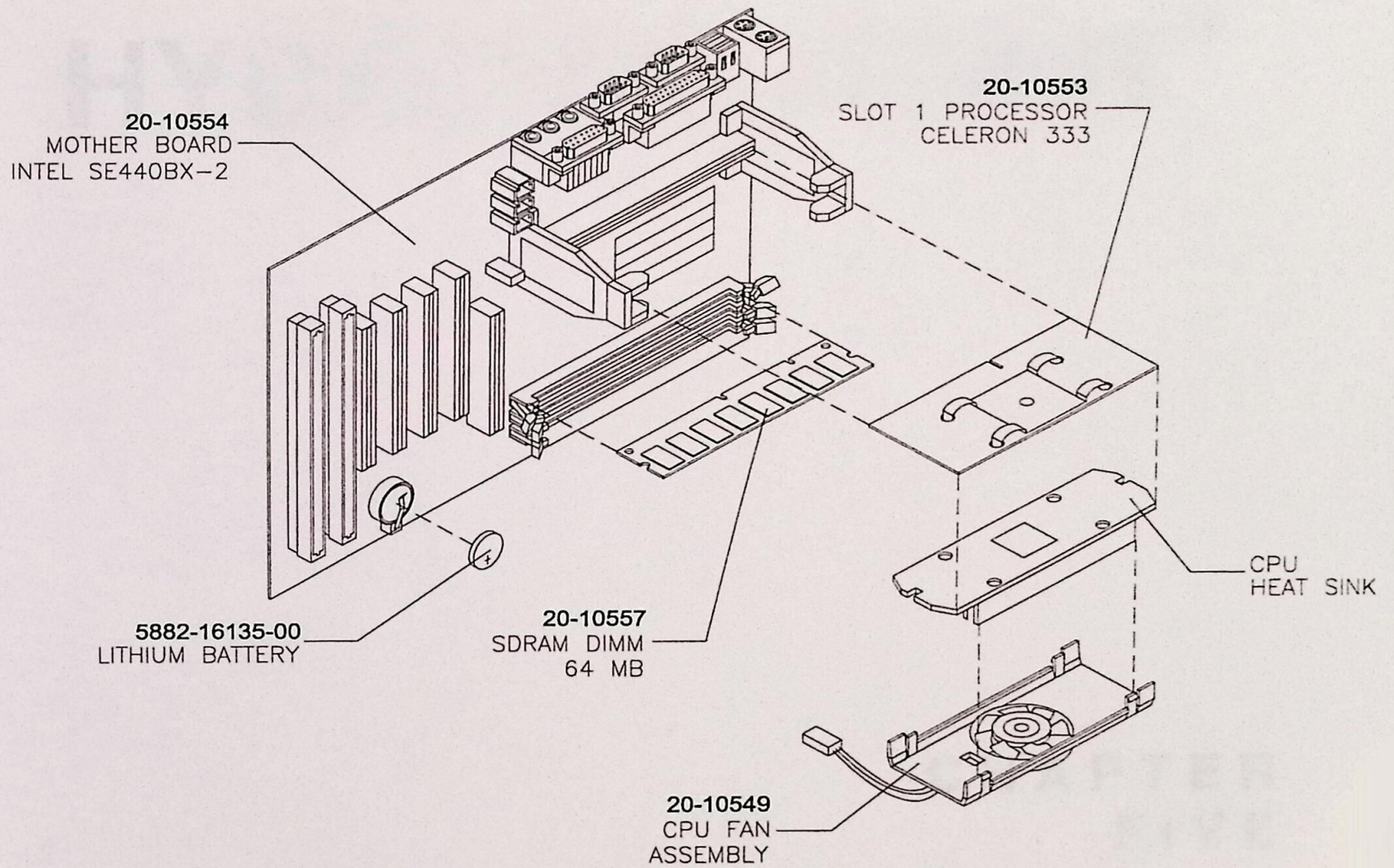


## MOUNTING BRACKET COMPONENTS





## ELECTRONIC COMPONENTS





## NOTES



# HYDROTHUNDER<sup>TM</sup>

## CHAPTER FIVE

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### WIRING & CIRCUIT INFORMATION

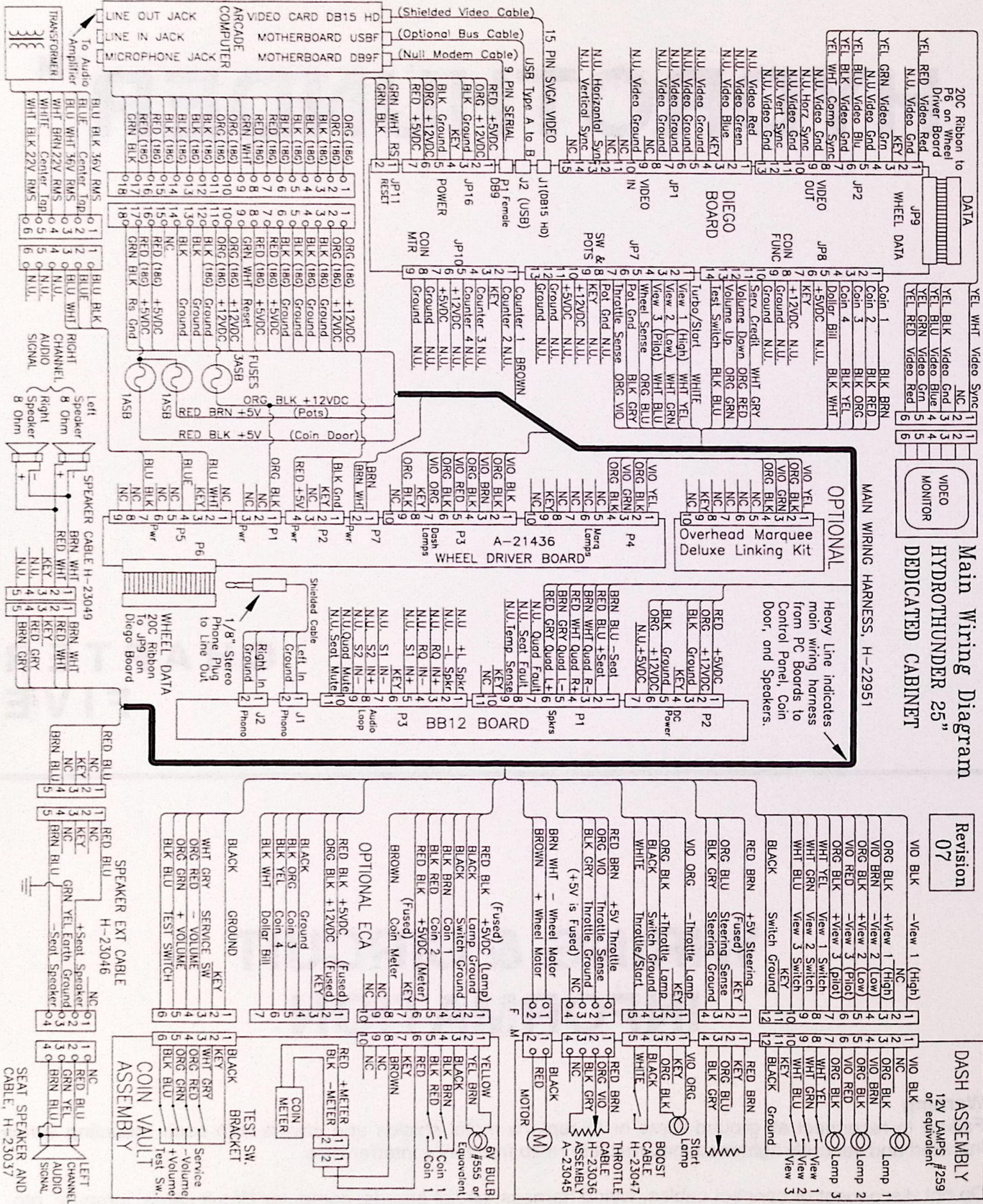
**Warning**

Failure to reconnect all ground wires or to replace metal shields and covers with each mounting screw installed and securely tightened may result in radio frequency interference.

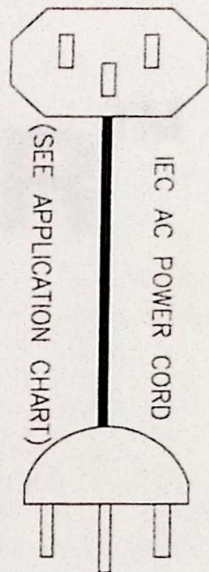
Do not disconnect or connect cables, wiring harness, circuit boards, computer circuit cards, jumpers, etc., with the power ON. Doing so can damage game electronic components and void your warranty.



## CABINET WIRING DIAGRAM



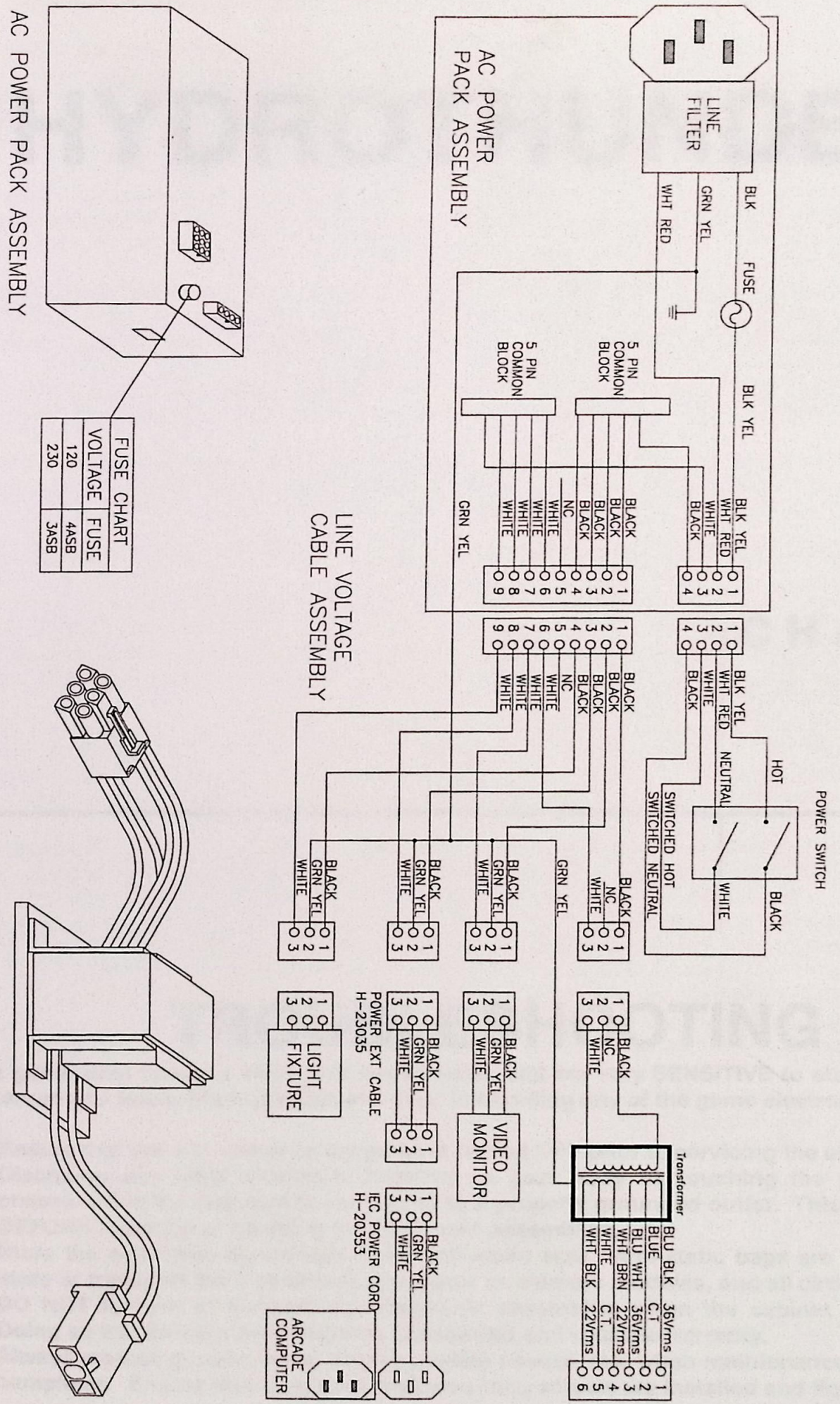




# Power Wiring Diagram HYDROTHUNDER 25" DEDICATED CABINET

Revision  
02

## POWER WIRING DIAGRAM





**FURTHER INFORMATION IS UNDER DEVELOPMENT.**



# HYDROTHUNDER<sup>TM</sup>

## CHAPTER SIX

### TROUBLESHOOTING

This game uses complex electronic components that are very SENSITIVE to static electricity. Observe and follow these precautions prior to handling any of the game electronics:

1. Ensure that the A.C. power to the game is turned OFF prior to servicing the electronics.
2. Discharge any static electricity build up in your body by touching the power supply chassis while the line cord is connected to a properly grounded outlet. This is to be done BEFORE touching or handling the electronic assemblies.
3. Store the electronic assemblies in an anti-static area. Anti-static bags are to be used to store or transport the disk drives, processor or memory modules, and all circuit cards.
4. DO NOT remove or connect any electronic assemblies when the cabinet power is ON. Doing so will damage the electronic assemblies and void the warranty.
5. Always replace ground wires, shields, safety covers, etc. when maintenance or service is completed. Ensure that all ground and mounting screws are installed and tightened firmly.



## GAME DOES NOT START

### 1. Game appears completely non-functional; no audio, no illumination, no video display.

- A. Check that the Power Switch has been turned ON (on top corner at the rear of the main cabinet).
- B. Turn OFF the game power. Unplug the A.C. line cord. Examine the Power Chassis fuse or circuit breaker. The Computer Line Voltage Switch must be set to agree with the local line voltage. Ensure that the Computer Power Supply Switch has been turned ON.
- C. Remove the Line Cord. Test the line cord, power plug and I.E.C. connectors for breaks or damage. Verify the continuity of each wire in the cord. Install the cord at the Power Chassis and press firmly to fully seat the connector into the supply receptacle. Also check the computer cord.
- D. Unlock and open the cabinet door or panel as required to expose the game electronics. Ensure that cabinet wiring harness connectors are fully seated in the corresponding power supply and board connectors (refer to Wiring Diagram, Section Three). Inspect wiring for breaks or damage.
- E. Examine the A.C. fuse on the Power Chassis under the Computer, and D.C. Fuses on the cabinet wall or electronic equipment shelf. If any fuse is faulty, replace it with an identically rated fuse.
- F. Fully seat the A.C. plug in the power outlet. Verify that A.C. line voltage is present. Turn the game power ON. Check the D.C. wiring harness and connectors if a fuse opens the circuit again.

### 2. Video game appears non-functional, but currency acceptor price indicator is illuminated.

- A. Unlock and open a cabinet door or panel as required to expose the game electronics. Inspect the circuit board assemblies under low light level conditions. The Light Emitting Diodes (LEDs) glow if there is D.C. voltage in these circuits. This does not mean that voltages or signals are as they should be, but it does indicate that the boards are receiving some power from the power supply. There are no LED indicators inside the Computer.
- B. Turn OFF the game power. Inspect each board assembly. Ensure that the wiring harness connectors are attached and fully seated onto the mating board connectors. Verify that the harness is connected to the Computer. Check the other cable connectors in the same way.

**CAUTION: DO NOT REMOVE OR INSTALL ANY CONNECTOR WHEN POWER IS TURNED ON. DOING SO WILL DAMAGE THE GAME CPU BOARD ASSEMBLY AND VOID THE WARRANTY.**

- C. Verify that the circuit board jumpers are set as intended. Refer to the Board Configuration Charts for variables and default settings. Check the DIP switch settings where they apply.
- D. Turn ON the game power. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the circuit board power connector pins. Refer to the Cabinet Wiring Diagram for specific wiring information and voltage limits. *This Power Supply has no voltage adjustment.*
- E. Using the 2 Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.
- F. Verify that the game runs and completes the power-up self-test sequence without any errors. Note errors and/or failures found during these tests. Compare the individual circuit board Light Emitting Diodes with the LED Indicator Status Charts and note any discrepancies.
- G. Turn off the Computer and wait for the hard disk drive to stop spinning (leave the game power on). Loosen the Computer case lid thumbscrews and lift off the cover. Turn the Computer power on and listen carefully for beeping sounds. Compare these beeps with the Error Code Chart.



## LINKING PROBLEMS

### 1. Cannot connect games together. Linking cables are present in each game.

- A. A crossover coupler is required to set up interconnection between games. Each coupler connects two games (one pair). *Do not use standard telephone type couplers or wiring to link games.*
- B. A concentrator hub is needed to set up a local network. Hub Link Kits permit up to eight game connections. Basic kit brackets and spacers are required to construct a complete game array.
- C. This linking system uses 10Base-T ETHERNET type Category 5 twisted pair communications wiring for the game data exchanges. *Do not substitute other cables without factory authorization.*

### 2. Game functions correctly by itself, but does not recognize other players in linking operation.

- A. Note and record any error messages that occur during self-test. Unlock and open the coin door. Press and hold the TEST MODE switch to enter the menu system. From the Main Menu, choose the ADJUSTMENTS MENU, then select NETWORK ADJUSTMENTS. Ensure that Network Enable is set to ON, and that the games all have a different identification number (Unit 1, 2, etc.).
- B. From the DIAGNOSTICS MENU, choose NETWORK TESTS. These tests will verify some of the communication functions in this game. Verify that power is applied if a Hub is in use (a Hub may be located inside one of the game cabinets, behind the games, or mounted in a remote location).
- C. Inspect the hub indicator lights. Each active port should have an illuminated indicator. If a cable is connected and there is no indicator lit for that position, check for cable continuity from hub to game. Ensure that no loose parts or wires are caught in the hinges, doors, or under the cabinet.
- D. Unlock and open the rear door. Verify that the linking cable is connected to the Network Card in the Computer. Check each of the other game's linking cables in the same way.
- E. Verify that each linking cable is operating properly by placing it in a known good unit.

### 3. Some games in a group link properly while others do not.

- A. All linked cabinets require the same software version. It does not matter which revision level is installed, only that all games must be the same. A "VERSION MISMATCH" error message will appear if this is the problem. Contact your distributor to resolve this difficulty.
- B. Coupled games require crossover connections. Standard couplers appear identical to the devices supplied with the games, but they do not have the internal crossover. Verify that each linking crossover coupler is operating properly by placing it in a known good link between two games.
- C. Networked games do not require a crossover (the hub has an electronic crossover function). Ensure that the switches on the hub are set correctly according to the Hub Link Kit instructions. Inspect the hub indicator lights for link activity. Consult manufacturer's literature for diagnostics.
- D. *Do not use an additional crossover connector and another cable to extend a Game or a Hub Link connection.* Two crossovers will cancel out and cause the same problem as no link crossover. The transmit and receive line pairs must interconnect in order for data to be exchanged.
- E. Separate communications wiring from other wiring, especially line cords. If unavoidable, cross at right angles to limit noise pickup. *Do not bundle network cables with any other wires.*



## PLAYER CONTROL PROBLEMS

### 1. Player controls are intermittent or completely non-functional. Game starts normally.

- A. Turn off power for one minute and turn the game on again. The automatic game POWER ON SELF TEST routine will check the electronics. The screen may report errors. If video circuits do not operate properly, the Computer produces a series of beeps (refer to ERROR MESSAGES).
- B. Unlock and open the coin door. Enter the game menu system by pressing and holding the TEST MODE switch inside the coin door. From the Main Menu, choose DIAGNOSTIC MENU and select SWITCH AND LAMP TEST. Use these tests to confirm the operation of each switch and light.
- C. Check that the cabinet wiring is correct for this game. Ensure that the controls are properly connected to the circuit board connectors. Also check the wiring harness and cables between the circuit boards and the Computer. Refer to the Wiring Diagram for specific information.
- D. Ensure that no loose parts or wires are caught in the hinges, latches, or switch contacts. Check continuity in each of the switch connections (Common to Normally Open or Common to Normally Closed). Verify that the control is operating properly by placing in a known good unit.
- E. Verify that dashboard switch light bulbs are the type specified in the parts listing. Other bulbs will light, but the higher heat level can cause the switches to bind or stick after hours of operation.

### 2: Steering wheel is partly functional, but video is present and game appears to start normally.

- A. Turn off power for one minute and turn the game on again. The automatic game POWER ON SELF TEST routine will check the electronics. The screen may report errors. If video circuits do not operate properly, the Computer produces a series of beeps (refer to ERROR MESSAGES).
- B. With the game power ON, check the flow of air near each of the Computer fans. The case cooling fans are intake fans; the power supply fan is an exhaust fan. Ensure that nothing blocks air flow.
- C. Unlock and hold a cabinet door or panel partially open. Inspect the Motor Board Assembly under low light level conditions. A glow will be seen from the Light Emitting Diodes if there is voltage in the motor driver circuits. This does not mean that voltages or signals are as they should be, but it does indicate that the Motor Board Assembly is receiving some A.C. power from the transformer.
- D. Turn OFF the game power. Adjust the seat to its maximum rear position. Open the dashboard. Support the steering wheel and remove the outer mounting screws. If present, remove the metal shield over the motor assembly. Inspect for faulty belts, bearings, couplings, worn gears, etc.



**WARNING: Motor Driver Board heatsink, power resistors, and other components may be very HOT. The D.C. Motor in the Steering Wheel Assembly may also have become HOT.**

- E. Examine the fuses and cables on the Motor Board Assembly. If any fuse is faulty, replace it with an identical fuse from the spare parts bag. Replace the spare fuse when repairs are complete.
- F. Using a digital voltmeter, verify that A.C. voltage between each Motor Board Assembly fuse holder and ground is approximately 25V. Refer to the Wiring Diagram for specific information.
- G. Using the 20 Volt A.C. setting on a digital voltmeter, measure the D.C. voltage at the motor. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise. *Do not move the steering wheel, drive belt, or motor while making this measurement.*
- H. Verify proper operation of game Motor Board Assembly by placing it in a known good game.



## AUDIO PROBLEMS

### 1. Audio is non-functional, but video is present and game appears to operate normally.

- A. Enter the game Menu System by pressing and holding the TEST MODE switch. From the Main Menu, choose the VOLUME MENU. Check that Attract Music is ON (enabled). Verify that all volume levels are set well above Zero. Change the levels if necessary to make the game audible.
- B. Turn OFF the game power. Unlock and open the cabinet door or panel. Ensure that the wiring harness connectors are attached and fully seated onto the mating board connectors. Verify that the harness is connected to the Computer. Check the audio cable connectors in the same way.
- C. Remove grilles, covers, etc., and inspect the speakers. Ensure that no loose parts or wires are caught in speaker cones, terminals, mounting screws, or stuck to the magnets.
- D. Turn ON the game power. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the Power connector pins. Verify each of the Computer voltage sources.
- E. Using the 2-Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.
- F. Verify proper operation of the Audio Board Assembly by placing it in a known good game.

### 2. The audio is distorted, muffled or missing frequencies. A constant low hum may be present.

- A. Turn OFF the game power. Remove each grille and check the speaker. Ensure that the smaller speakers are FULL RANGE (100 to 10,000 Hz response) and rated for at least 25 WATTS. The seat speaker and any woofer must be rated for at least 40 WATTS.
- B. Check that the speaker wiring is not reversed at one of the speakers. Weak low frequencies and a thin or hollow sound quality are symptoms of incorrectly phased speakers. This condition may not be found during the sound tests, but it is audible during normal game play.
- C. Check that the cabinet wiring is correct for this game. Verify that the cabinet wiring provides separate wires (not a common return) for each speaker. Ensure that all cabinet ground wires are connected. Refer to the Cabinet Wiring Diagram for specific wiring information.
- D. Using the 2-Volt A.C. setting on a digital voltmeter, measure voltages at the speaker terminals. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.
- E. Verify that the speaker is operating properly by placing in a known good unit.

### 3. Only one speaker is working. The audio is missing elements.

- A. Enter the game Menu System by pressing and holding the TEST MODE switch. From the Main Menu, choose the VOLUME MENU. Check that Attract Music is ON (enabled). Verify that all volume levels are set well above Zero. Change the levels if necessary to make the game audible.
- B. Verify that cabinet wiring for this game is correct. Ensure that all speakers are connected to the audio output wires. The audio cable must be fully seated in the Computer Line Output Jack. Check for broken or shorted wires. Refer to the Cabinet Wiring Diagram for wiring information.
- C. Verify that the game runs and completes the power-up self-test sequence without any errors. Note errors and/or failures found during these tests. Compare the individual circuit board Light Emitting Diodes with the LED Indicator Status Charts and note any discrepancies.
- D. Verify that the audio circuit board assembly is operating properly by placing in a known good unit.



## VIDEO PROBLEMS

### 1. Monitor appears non-functional, but audio is present and controls operate as expected.

- A. Open the cabinet to expose the Video Monitor. Verify that A.C. Power is connected to the Video Monitor. Inspect the neck of the CRT under low light level conditions. The CRT base glows if there is voltage in the filament circuits. This does not mean that other voltages or signals are as they should be, but it does indicate that monitor circuits are receiving some power.
- B. Turn OFF the game power. Verify that the Video Signal and the Remote Adjustment Board connectors are fully seated on the Video Monitor Board Assembly. Check the other monitor connectors in the same way. **Do not operate a monitor without a Remote Adjustment Board.** Ensure that video cables are connected to the circuit board assemblies and the Computer.
- C. Examine the A.C. line fuse on the Video Monitor Board Assembly. If the fuse is faulty, replace it with an identical fuse of the proper voltage and current rating.
- D. Ensure that no loose parts or wires are caught on the chassis or the mounting brackets.
- E. Check that the brightness (intensity) and contrast are set above their minimum levels.
- F. Verify that the Video Monitor is operating correctly by placing it in a known good unit.

### 2. The power-up self-test will run, but the game does not appear. No audio is present.

- A. Unlock and open a cabinet door or panel as required to expose the game electronics. Check the floppy disk drive to ensure that a diskette has not been left installed in the Computer. If one is present, eject it. Turn off the Computer and wait for the hard disk drive to stop spinning (leave the game power on). Turn the Computer back on and allow the game to load normally.
- B. Note and record any error messages that occur during self-test. Press and hold the TEST MODE switch to enter the menu system. From the Main Menu, choose DIAGNOSTIC MENU, then select HARD DRIVE TEST. These tests will verify some of the Hard Disk Drive functions in this game.
- C. Turn off the Computer and wait for the hard disk drive to stop spinning (leave the game power on). Loosen the Computer case lid thumbscrews and lift off the cover. Ensure that the Hard Disk Drive Assembly ribbon cable connector is fully seated into the mating connector on the mother board. Check the Hard Disk Drive Power Cable. Verify that all hard drive mounting screws are installed.

**CAUTION: DO NOT REMOVE OR INSTALL ANY CONNECTOR WHEN POWER IS TURNED ON. THIS WILL DAMAGE THE COMPUTER OR DISK DRIVE AND VOID THE WARRANTY.**

- D. Check that the Hard Disk Drive Assembly is the correct part for this game. Each Hard Disk Drive is labeled with the assembly number and the software version (see Parts chapter for numbers).
- E. Verify that the circuit board assemblies are correct for this game. Each circuit board is marked with the manufacturer name, assembly number and the hardware version.
- F. Turn ON the game power. Look *under* the Hard Disk Drive Assembly as the game is first turned ON. The Hard Disk Drive Activity LED will flash if the drive is operating properly.
- G. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the Power connector pins. Refer to the Cabinet Wiring Diagram for specific wiring information.
- H. Using the 2 Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading indicates that the supply voltages are unstable and may contain ripple or noise.



**3. Monitor will not lock onto the signal and provide a stable picture, colors are missing, etc.**

- A. Check connectors and cables for wiring continuity from Computer to circuit board to video monitor. Verify that all jumpers are set correctly for this monitor. Refer to Board Configuration. Check that the SYNC jumper is set to match the sync requirements of the monitor.
- B. Ensure that the Video Monitor Assembly is correct for this game. Use of video monitors with different resolution will result in what appears to be horizontal tearing or complete loss of sync.
- C. Verify that the Video Monitor is operating correctly by placing it in a known good unit.

**4. Game operates normally, but video picture wavers or rolls, has dark bars, uneven colors, etc.**

- A. Check connectors and cables for wiring continuity from the circuit boards to the Video Monitor.
- B. Ensure that all the cabinet ground wires are connected, especially at the Video Monitor Chassis.
- C. Move the cabinet farther away from machines, appliances, other games, etc. Very strong electrical or magnetic fields are emitted from some equipment when it is operating normally.
- D. Verify that the Video Monitor is operating correctly by placing it in a known good unit.

**MISCELLANEOUS**

**1: Marquee lamp is intermittent or non-functional. Game starts and plays normally.**

- A. Open the marquee. Remove the glass and artwork. Remove fluorescent tube and starter from their holders. Install new lamp if cracks or darkened ends are found. Clean the tube and starter.
- B. Verify that the lamp and starter pins are making good connection with their socket contacts.
- C. Measure the Fluorescent Lamp Assembly A.C. voltages (refer to Wiring Diagram for information). Check wiring and connector continuity from the A.C. Power Chassis to the Lamp Assembly.
- D. Ensure that the Fluorescent Lamp Ballast is rated for the local A.C. line voltage and frequency.
- E. Check for continuity of each fluorescent lamp filament, the starter, and the ballast. One at a time, verify that the lamp, starter, and ballast operate by placing each in a known good unit.

**2. Game operates normally, but cabinet gets very warm after several hours of use.**

- A. Check bottom and rear of cabinet for blocked air flow. Move game away from sources of heat.
- B. Turn OFF the game power. Apply high power vacuum cleaner to vent holes to remove dust.
- C. Unlock and remove the cabinet door or panel. Ensure that all fans are connected and operating.

**3. The game does not start and there is no audio. Error Messages may appear on the screen.**

- A. Check any assembly (RAM, ROM, Battery, etc.) identified in the Error Message. Ensure that all cables and wiring harness connectors are connected (refer to Wiring Diagram for information).
- B. Call your authorized distributor for help with unresolved screen messages.



## ERROR MESSAGES

### 1: Game appears dead, no audio or video. Currency acceptor price indicator is illuminated.

- A. Unlock and open a cabinet door or panel as required to expose the game electronics. Inspect the Computer to see if the fans are operating. If not, ensure that the Computer Power Supply is connected to its power cable. Verify that the Computer Power Supply is turned ON.
- B. Turn off the Computer and wait for the hard disk drive to stop spinning (leave the game power on). Loosen the Computer case lid thumbscrews and lift off the cover. Turn the Computer power on and listen carefully for beeping sounds. Compare these beeps with the Error Code Chart.
- C. Call your authorized distributor for help with unresolved error messages. *Do not attempt to move Computer circuit cards into alternate slots – these circuits are assigned to specific positions and will not be recognized by the operating system even though the cards are known to be good.*

### 2: Error messages are present on the screen. Game will not load or play.

- A. Turn OFF the game power. Unlock and open a cabinet door or panel as required to expose the game electronics. Inspect each board assembly. Ensure that the wiring harness connectors are attached and fully seated onto the mating board connectors. Verify that the harness is connected to the Computer. Check the other cable connectors in the same way.
- B. Call your authorized distributor for help with unresolved error messages. *Do not attempt to move Computer circuit cards into alternate slots – these circuits are assigned to specific positions and will not be recognized by the operating system even though the cards are known to be good.*

### Power On Self Test Codes (audio beeps only; video may or may not be present). Refer to Note 1.

No Beep of any kind	No System power	Check Power Supply and cables
1 Continuous Beep	Partial System power	Check Power Supply and cables
1 Short Beep	Normal Start – no errors detected	Check other game components
2 Short Beeps	Processor problem	Check Processor/fan module
3 Short Beeps	Graphics initialization problem	Check Video circuit card, cables
4 Short Beeps	Processor problem	Check Processor/fan module
5 Short Beeps	Insufficient System Memory	Check DIMM circuit modules
6 Short Beeps	Peripheral problem	Check other game components

### System Error Message Codes (one or more lines of text visible on video screen). Refer to Note 2.

GAME START UP:	Normal Start – no errors detected	Check other game components
XXXX INIT or INIT FAILURE:	Circuit/File initialization problem	Check drive or circuit named
XXXX DATA LOAD:	Files corrupted or circuits failing	Check drive or circuit named
CONFLICTING UNIT ID:	Linking problem	Check for unique unit ID number
VERSION MISMATCH	Software program problem	Check for differing revision level

#### Notes:

1. Although the Computer System Motherboard and some of the circuit cards appear similar to those used in other computers, they have been reprogrammed to match the specific needs of this game. *The Power On Self Test Codes for other computers will not be the same as those presented here.*
2. Problems occurring in the wiring or game circuits may not cause any on-screen error messages. Some difficulties may be detected using the menu system diagnostic or calibration procedures.







## WARNINGS & NOTICES

### WARNING

USE OF NON-MIDWAY PARTS OR CIRCUIT MODIFICATIONS MAY CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE! USE ONLY MIDWAY AUTHORIZED PARTS.

- \* Use only authorized components and parts. Failure to do so will void warranty and may result in incorrect and/or unsafe operation. Substitute parts or modifications may void EMC directive or FCC type acceptance.
- \* This game is protected by federal copyright, trademark and patent laws. Unauthorized modifications may be illegal under federal law. This also applies to MIDWAY GAMES INC. and HYDROTHUNDER logos, designs, publications and assemblies. Moreover, facsimiles of MIDWAY equipment (or any feature thereof) may be illegal under federal law, regardless of whether or not such facsimiles are manufactured with MIDWAY GAMES INC. components.

### WARNING

Prevent shock hazard and assure proper game operation. Plug this game only into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

### WARNING

A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g. seizures or loss of awareness), immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generated, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### NOTICE - FCC COMPLIANCE LABEL

### NOTICE

When MIDWAY ships a game, it is in compliance with FCC regulations. The FCC label on your cabinet is proof. If this label is missing or damaged, legal repercussions to the owner or distributor of the game may result. If your game does not have an FCC label, contact MIDWAY immediately.

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